American Machinist

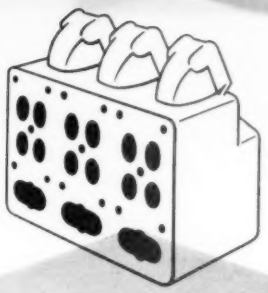
McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

APRIL 16, 1951

Teardown, test, and reassembly of the J-47 turbojet after green run — see page 2

You can't be half-hearted about modernization

A SPECIAL REPORT



cylinder head production GETS A LIFT

with this new

DOUBLE-SLIDE Heald Bore-Matic

In the borizing of cylinder heads, holes are sometimes too closely spaced to permit the use of a cluster-head arrangement. In such cases the part must either be borized in separate setups—or with vertical as well as lateral indexing.

Confronted with this problem, an automotive manufacturer called in his Heald representative. The result—cylinder head production was materially increased, by the use of a new Heald Model 321 Bore-Matic, with the time-saving, double-slide arrangement shown below.

Three holes are bored, counterbored and chamfered in each of four operations. After the first set of holes has been completed, the vertical slide is indexed by push-button, and the second set is borized. The cross slide is then indexed and the next two sets of holes (upper and lower level) are borized in the same sequence. Quick-change quills permit borizing of two different size holes, for exhaust and intake.

Remember—when it comes to precision finishing, it pays to come to Heald.

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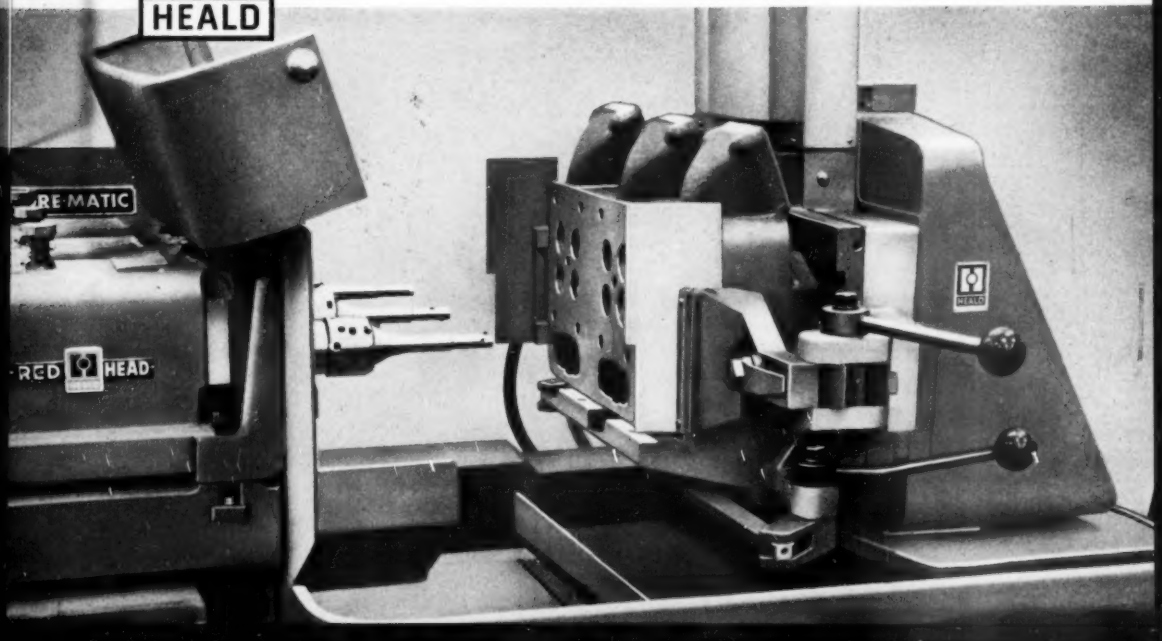

American Machinist

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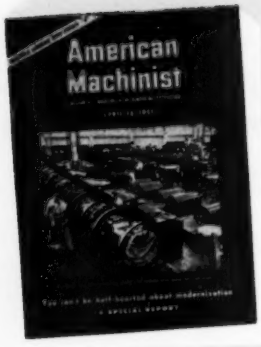

Chips and QUIPS

Reassembly . . . Our cover Kodachrome, taken from a fork truck in the GE turbojet plant at Lynn, Mass., shows other materials-handling units: castered assembly fixture, railcar rollover fixtures, trucks, and a hoist or two. It is typical of modern metalworking production and its inherent need for material handling, thus particularly appropriate to cover our Materials Handling Show Number.

Turbojets are torn down, inspected, then reassembled after green run on a long U-shaped line. This is the bottom of the U, and various subassemblies can be seen as they are moved across the U during inspection. Many special covers are used to protect elements during this process (see *AM*, p154, Feb. 5).

For the Show . . . In recognition of the Materials Handling Show at month's end, we provide in this issue a list of exhibitors, descriptions of new products to be shown for the first time there, and like data. For everybody, showgoer or no, we have two specialized materials-handling articles. Our lead deals with bar-stock handling. When 4-wheel carts were replaced by hoists, conveyors and monorails, physical labor was reduced and costs cut 1/3. Ben Brosheer tells the story . . . B. Fassel of Alcoa describes a cross conveyor which handles blanks from one press to another. And there's more on handling in the Saco-Lowell story.

Deburring . . . Chevrolet deburrs transmission gears by wet tumbling with aluminum-oxide chips and compound in rubber-lined barrels. Herbert Chase walks you through the setup.

Tape It . . . Double-faced adhesive tape can even hold small parts for machining! C.O.T. Bolling describes how Westinghouse does it, provides three photos . . . We've also got another trick—using zinc pads to support aluminum die castings for trimming in a die. H. C. Slagle (see biog) gives you the details in a 2-page article.

Why Stewards? . . . C. D. Mackinnon, of Lanarkshire, Scotland, former shop steward in a country where labor is in the government too, explains the change there in relationship between management and labor as a result of overemployment created by the export-for-dollars drive. An interesting short piece from overseas.

750 Holes A Minute . . . IBM has a fixture that drills and countersinks 1496 holes in 1/8-in. Bakelite panels in less than 2 min. Loading is quick and operation thereafter is automatic, by Micro switches, cams, and relays. A special drillhead permits close spacing. We thought you'd like to know about it, so asked R. Beach of the Endicott (N.Y.) plant to give you details.

Rejuvenation . . . Only once in an editor's lifetime is he likely to run into such a thoroughly candid story as our current Special Report. Here, capsulized, is what Saco-Lowell Shops have done to modernize in the last four years—telescoping steps most companies have been making for 25 to 50 years. The problems are here, and the solutions, plus the advantages that have convinced Saco-Lowell that steps thus far are "only the beginning."

Coming . . . April 30 *AM* is jam-packed with unusual articles. The Special Report describes quality-control procedures at Thompson Products. Then A. O. Schmidt of Kearney Trecker describes milling of used die blocks with carbides, reporting some soft-steel milling at speeds up to 2500 fpm. Our lead article is a Special Report in miniature, describing metalworking applications of ultrasonics. We also have three tooling tricks from Watertown Arsenal; a lengthy treatment of a special machining problem—making a large multivane impeller on a Jigmil, complete with figures; and one on dies for motorcycle parts. And a beautiful 4-color cover from a machine-tool builder celebrating its 125th anniversary: The Heald Machine Company.

ALCOAN . . . Harry C. Slagle, works manager of the Chicago Works, Aluminum Company of America, was born and educated a Buckeye. After graduation from Ohio State Univ. in 1925 with an engineering degree, he went to Alcoa at Buffalo. In 1934, he was transferred to Purchasing in Pittsburgh, in 1942 moved on to Jones Mills, Ark., to assist in construction of a reduction plant of which he later became works manager. In 1945, he was transferred to New Castle, Pa., as works manager of an aluminum forging plant. Late the next year, he moved to the Chicago area to take charge of construction of the die-casting plant at Hillside, Ill., where he has been works manager since its completion in 1948. He authored our current article on padding trimming dies with zinc.

QUENCHING PRESSES TO MEET *YOUR* REQUIREMENTS

GLEASON NO. 16 QUENCHING PRESS FIRST

Gleason Quenching Presses are an integral part of every industrial unit where the heat treatment of metal parts is required. If your needs are for a press capable of distortion-free quenching at faster production rates than heretofore possible, Gleason Works now provide three different models; the No. 16 with a 15" capacity, the No. 26 with a 24" capacity, and the No. 36 with a 36" capacity.

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GLEASON NO. 36 QUENCHING PRESS

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- **Simplified set-ups.**
- **Metallurgically correct oil flow.**
- **Safer loading.**
- **Quenching without distortion.**

Write for literature. Send in prints of parts to be quenched for our recommendations.

BUILDERS OF BEVEL GEAR MACHINERY FOR OVER EIGHTY-FIVE YEARS GLEASON

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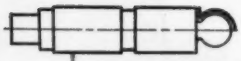
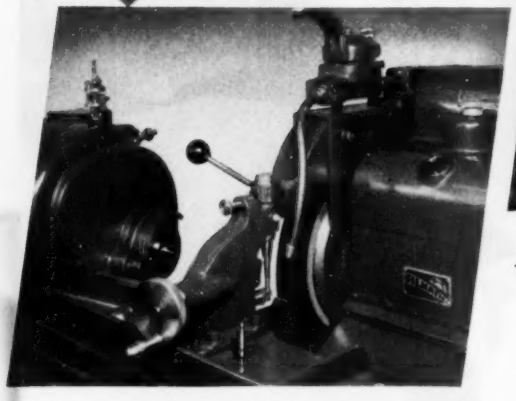
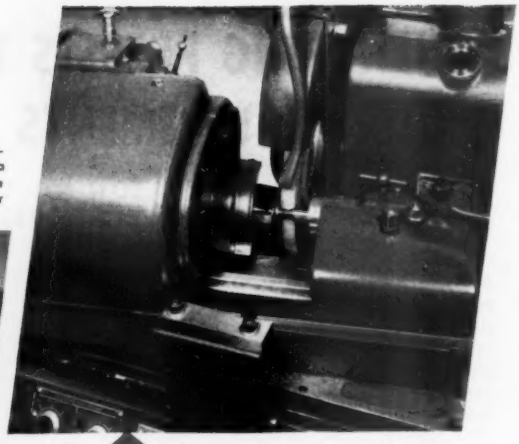


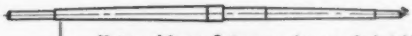
Radius and adjoining face ground simultaneously. This 4" Plain Hydraulic Grinder features a solid table with a short angular section for the headstock, and a combination radius and angular truing attachment.



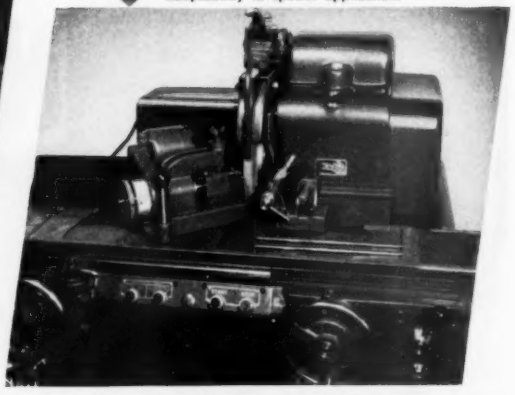


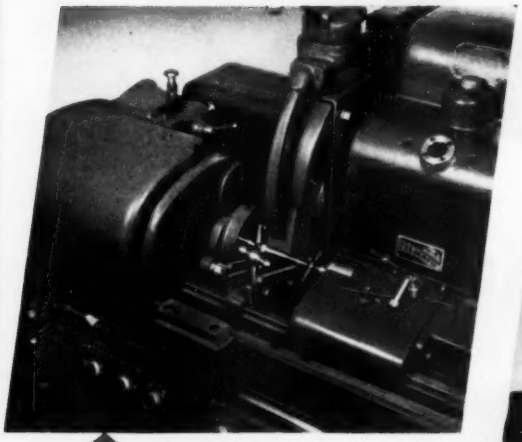
A short, short part . . . grinding the back face and shoulder of nozzles, 83 per hour, with the aid of a special holding device. This 4" Plain Hydraulic Grinder handles other operations, too.

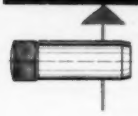
Ideas for
of small



Motor driven fixture replaces swivel table, headstock and footstock, for grinding center angle and point radius on textile spindle blades . . . another example of 4" Plain Hydraulic's adaptability to special application.





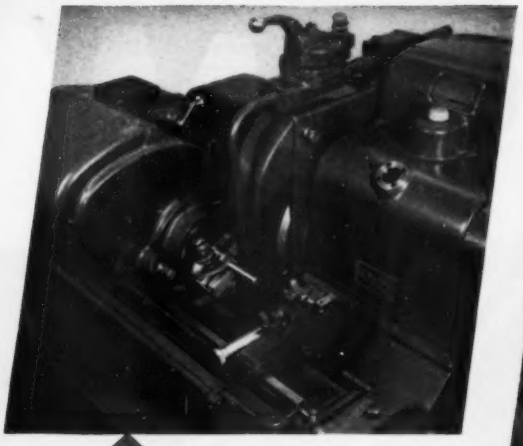


Micrometer barrels, 200 per hour, grinding diameter and bevel simultaneously. This 4" Plain Hydraulic is equipped with work cradles, hydraulic footstock, automatic infeed, and a special table type profile wheel truing attachment.

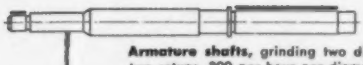
CINCINNATI

FILMATIC

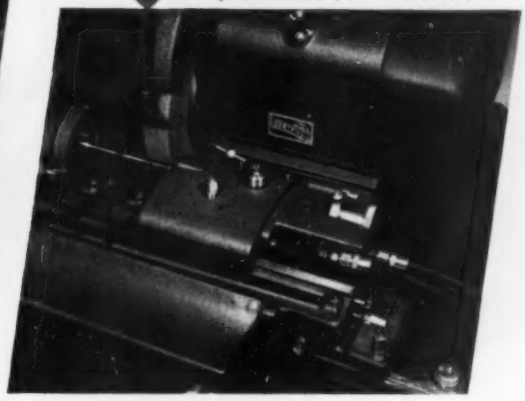
CINCIN



Crankshafts with .050" throw ground from the solid. Cincinnati Application Engineers tooled up a 4" Plain Hydraulic for this job with a work holding fixture featuring repetitive stopping for convenience in loading.



Armature shafts, grinding two diameters in two setups, 200 per hour per diameter. Labor-aiding equipment for the 4" Plain Hydraulic illustrated here consists of automatic infeed, hydraulic footstock, and work cradles.



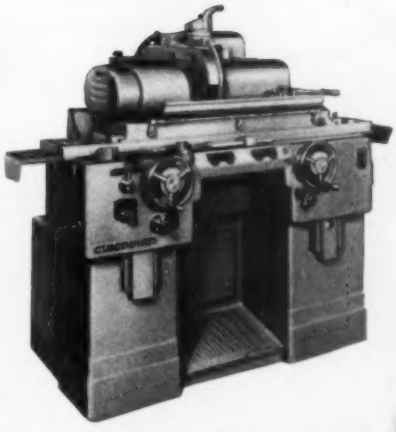
Production...
precision ground parts

In general, the cost of machining operations on small parts should be as small as the part. Six examples of how this goal is attained with CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machines are illustrated here. All are typical parts, with standard tooling or slight alterations on the machine to attain the highest rate of production at the lowest cost and minimum physical effort. Read how CINCINNATI FILMATIC 4" Plain Hydraulics contribute to these desirable results.

1) FILMATIC grinding wheel spindle bearings require no adjusting or maintenance for years.
2) You can count on quick sizing within .0001", traverse or infeed.
3) The bed is recessed so workers may be seated, yet all operating elements are at their finger tips.
4) Automatic Infeed Attachment controls the complete grinding cycle.

You may obtain more data by writing for literature, or look in Sweet's Mechanical File for brief specifications.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



CINCINNATI FILMATIC 4" Plain Hydraulic Grinding Machine. Complete specifications may be obtained by writing for catalog G-551-1.

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Internal and external gears as large as 100 inches pitch diameter and 8 inches face width can be cut to a high degree of accuracy with ease and dispatch... Now available with a new relieving cutter-spindle, adapting the machine to the cutting of external and internal helical gears—as well as spur gears... Power, weight and rigidity to take heavy cuts on coarse-pitch work, and the precision necessary for the finer finishing cuts... All this is wrapped up in the Fellows 100-Inch Gear Shaper... Any one of the Fellows offices will be glad to supply complete data and specifications.

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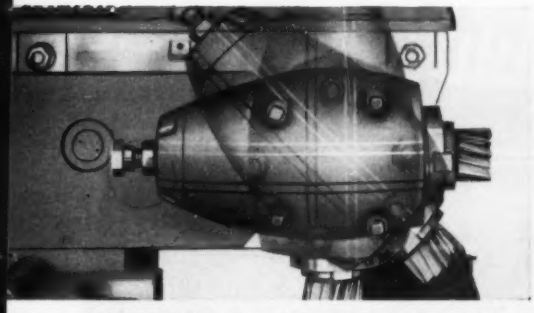
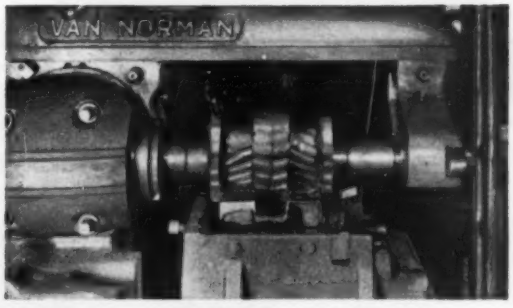
VAN NORMAN

MILLERS Cut High Production Costs

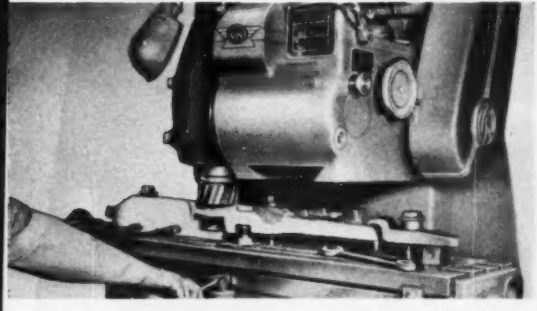
BY REDUCING IDLE MACHINE TIME



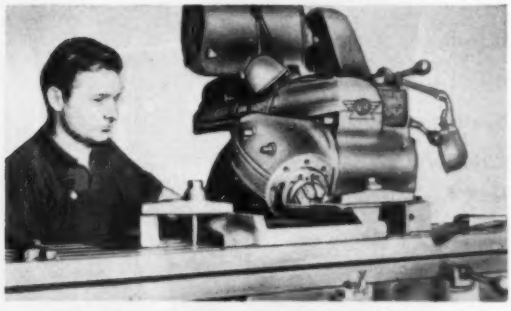
Adjustable Cutterhead permits horizontal, angular or vertical milling on one miller. This versatility is equal to several single purpose machines.



Horizontal Milling — Simply lock head in horizontal position and you're ready for horizontal milling. Ram-type overarm and outer support assures rigidity and accuracy.



Vertical Milling — With the cutterhead in vertical position, the operator is taking a vertical cut on the work piece.



Angular Milling — Lock the cutterhead in any desired angular position and you're ready for angular milling. Graduated dial in degrees makes positioning easy.

VAN NORMAN RAM TYPE MILLERS give you every advantage in reducing milling costs. The adjustable cutterhead reduces idle machine time to an absolute minimum. It permits one machine to perform horizontal, angular or vertical milling. There is no waiting for single purpose millers because practically all milling operations can be accomplished on the Van Norman Ram Type Miller. In addition, work setups are reduced and the operator gets out more work.

Van Norman Ram Type Millers are easy to operate. Front and rear controls permit operation from either location. Hardened and ground steel fixed cutterhead stops permit true settings at horizontal or vertical position. The rugged construction throughout assures accuracy and long life. Investigate Van Norman Ram Type Milling Machines for toolroom, laboratory, pattern and die work, job shop or production milling. Available with plain or universal saddles in a wide range of sizes. Write:

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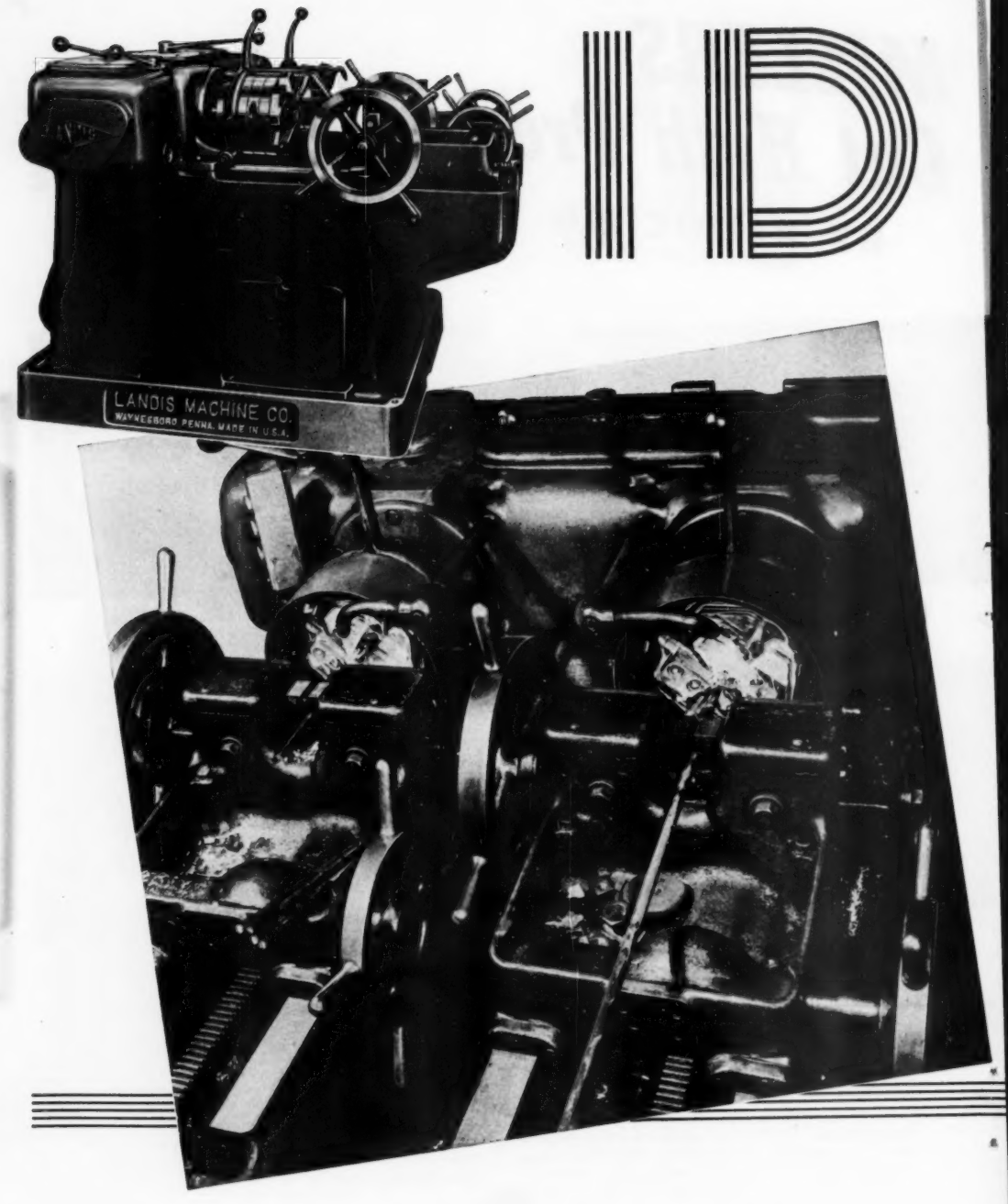


ID

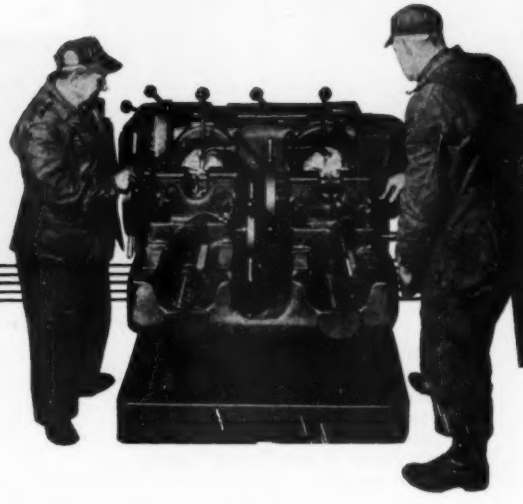
EAL—

For Small Shop Threading Jobs

ACCURATE THREADS • EASY OPERATION • LOW DOWN-TIME • VERSATILE CAPACITY

This 1" Landmaco Double Machine is threading ⅜" and ½" cold drawn steel rods for structural and ornamental steel. The 13 and 16 pitch USS threads are cut 6" long, but on similar jobs threads are cut up to 20-foot lengths. Production costs are lower than with previous methods. This installation is an example of the value of Landmaco Double Machines in job threading work.

Threads can be cut to Class 4 fit, yet work completed at the rate of 40 to 45 surface feet per minute, according to diameter. Two die heads can be operated on separate jobs, with separate operators, or both heads can be fed by a single operator. This Landmaco Double will cut threads ranging from ¼" to 1" in diameter, providing the versatility essential in any job shop. Larger Landmacos will handle a range from ⅜" to 2½" diameter.



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Production Up 90% with

modern LANDIS TOOL method

LANDIS TOOL
Precision Grinders

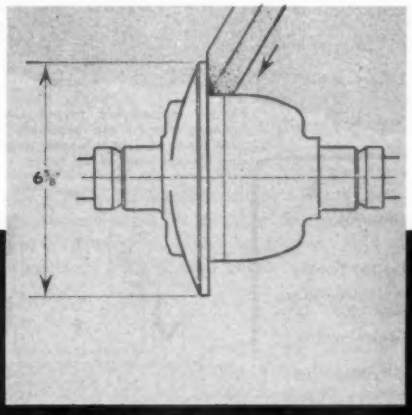
LANDIS TOOL 6" x 30" Type CH
PLAIN GRINDER WITH ANGULAR WHEELBASE
- Special Tooling
- Angular Wheelbase
- Hydraulic Infeed and Timer
- Right Angle Wheel Truing Fixture
- Lateral Locator

Finish Improved

combines two grinding operations

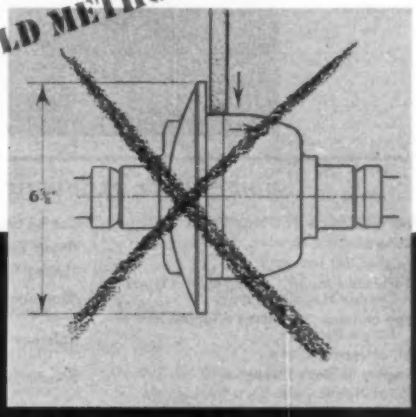
An automobile manufacturer reports almost doubled output of differential housings by changing from his former grinding method to this modern method engineered by Landis Tool. Previously, the job was done with a conventional wheelbase using a bumping operation to grind the shoulder. Both the diameter and the shoulder are now ground in a single operation with this new angular wheelbase grinder. A by-product is the highly superior finish on the two surfaces.

New Method



TWO SURFACES GROUND IN ONE OPERATION

Production: 135 per hour
Stock Removal: Diameter — .010"
Adjoining Shoulder — .005"

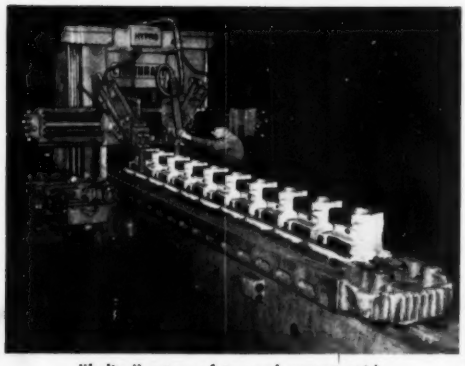


TWO OPERATIONS TO GRIND TWO SURFACES

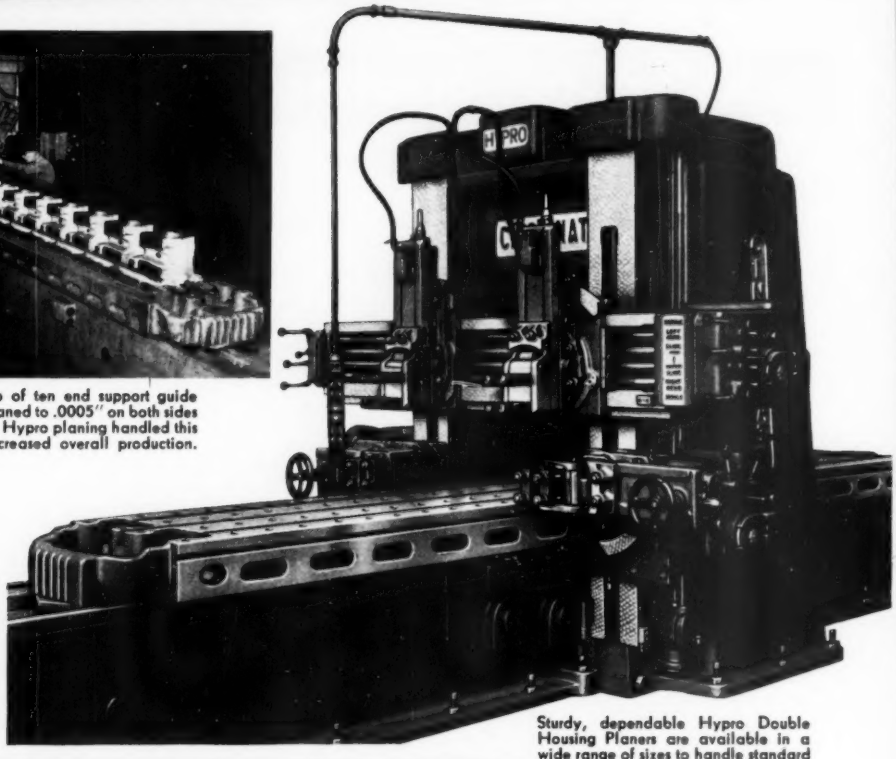
Diameter ground to size. Shoulder ground by moving work against side of wheel.

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U.S.A.

Where your production needs demand greater work output . . .



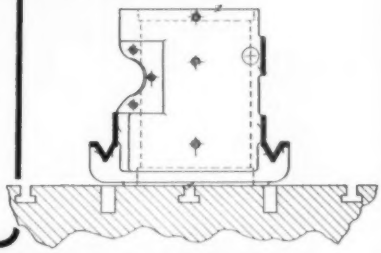
"In-line" set-up of ten end support guide blocks being planed to .0005" on both sides simultaneously. Hypro planing handled this way insures increased overall production.



Sturdy, dependable Hypro Double Housing Planers are available in a wide range of sizes to handle standard and special work of all types.

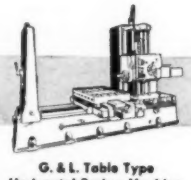
GUIDE BLOCK PRODUCTION FACTS

Part: End Support Guide Block
Material: Cast Iron
Weight: 290 lbs. Each
Machined On: 36" x 36" x 16' Hypro Double Housing Planer
Type of Setup: 10 Pieces Aligned in Single Row
No. of Setups: One
Amount of Stock Removed: ¼" to ⅜"
No. of Heads Used: Two Rail Heads
Cutting Speeds: 150 to 180 f.p.m.
Return Speed: 300 f.p.m.
Cutting Tools: Carbide Tipped Tools
Operation: Plane Pads on Sides and Vee Ways
Tolerances: Vees Held Central within .0005"
Machining Time: 6 Hrs., 52 Min.—10 Pieces—Floor to Floor



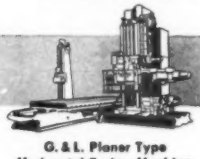
GIDDINGS & LEWIS
FOND DU LAC

G&L HYPRO



G. & L. Table Type Horizontal Boring Machine

G. & L. Floor Type Horizontal Boring Machine



G. & L. Planer Type Horizontal Boring Machine

. . . . these

CINCINNATI HYPRO PLANING METHODS

Save { *Setup time...* Through "In-Line" Work Mounting
Machining time... With Two Rail Heads Working at Once
Tooling time... With Ample Power for Full Use of Carbide Cutters
Overall time... Through Faster Cutting and Return Speeds

The simplicity of placing ten end support castings "in-line" for simultaneous planing operations illustrates the productive capacity of Cincinnati Hypro Planers. This method of work mounting not only speeds part output, but also insures duplicate operations on all the castings. Multiple mounting of parts on the planer table prorates tool setup over more work pieces and reduces overall setup time to help meet current production demands.

Rail Heads Work Simultaneously

Two rail heads working at once, plane bearing vee ways on both sides of the castings. This arrangement substantially reduces machining time and produces a vee accuracy within .0005". While only the rail heads are used to machine the guide blocks shown, it is practical to use the machine side heads simultaneously with the rail heads. This feature permits greater machine flexibility on different size and shape castings and weldments.

Power for Full Use of Carbide Cutters

Cincinnati Hypro Planers have ample power to use all types of carbide cutters at maximum feeds and speeds. Sturdy structure plus high horsepower input makes it possible to plane from 10 to 300 ft. per minute. Through maintenance of cutter efficiency with high speeds, there is less down-time for tool replacement and regrinding.

Faster Cutting and Return Speeds

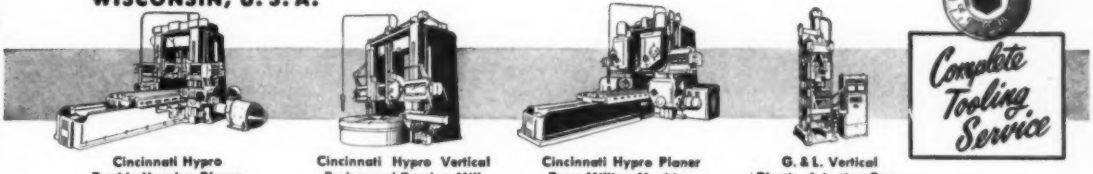
On this job, carbide tipped tools are used to plane at 150 to 180 ft. per minute. Return speed is 300 ft. per minute. Combination of these machining factors automatically reduces the overall time required to complete different workpieces.

To Increase Production Now

Submit your planing problem to experienced Hypro engineers. They will gladly advise you how you can remove more metal accurately and fast by planing. Write, wire or phone—there is no obligation.

MACHINE TOOL COMPANY

WISCONSIN, U. S. A.



Cincinnati Hypro Double Housing Planer

Cincinnati Hypro Vertical Boring and Turning Mill

Cincinnati Hypro Planer Type Milling Machine

G. & L. Vertical Plastics Injection Press

DAVIS Complete Tooling Service

Cutaway shows simple, rugged construction of Link-Belt Fluid Drive.

LINK-BELT Electrofluid Drive

with constant CUSHION ACTION

LINK-BELT

FLUID DRIVES

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.

12.318

AS EFFICIENT — as modern as the automatic transmission in today's automobile. Link-Belt Electrofluid Drive constantly provides a smooth flow of cushioned, shock-free power transmission. Ideal for loads of high inertia, repetitive shock or high starting torque type.

Here's how constant "CUSHION ACTION" reduces wear — cuts maintenance — and often lowers initial investment.

- Both motor and driven machine last longer because constant CUSHION ACTION protects them from overload and shock — torque, even under stall conditions, is limited by fluid drive capacity.
- On high-inertia loads requiring high starting torque, CUSHION ACTION permits motor to attain speed producing maximum torque before fluid drive output shaft revolves — often eliminating need for special or oversize motors.
- Because motor reaches 70% of full-load speed before engaging load, CUSHION ACTION starting current is less than half of normal, and power factor stays high.
- Maintenance of trouble-free Electrofluid Drives is limited to an occasional inspection of oil level.

What's more, you get all the exclusive advantages of constant CUSHION ACTION while maintaining the high efficiency of your existing drive. Book 2385 has complete information on five types of Link-Belt Fluid Drives — Electrofluid Drive, Electrofluid Gearmotor, Fluid Drive, Fluid Gear Drive and Fluid Coupling Drive.

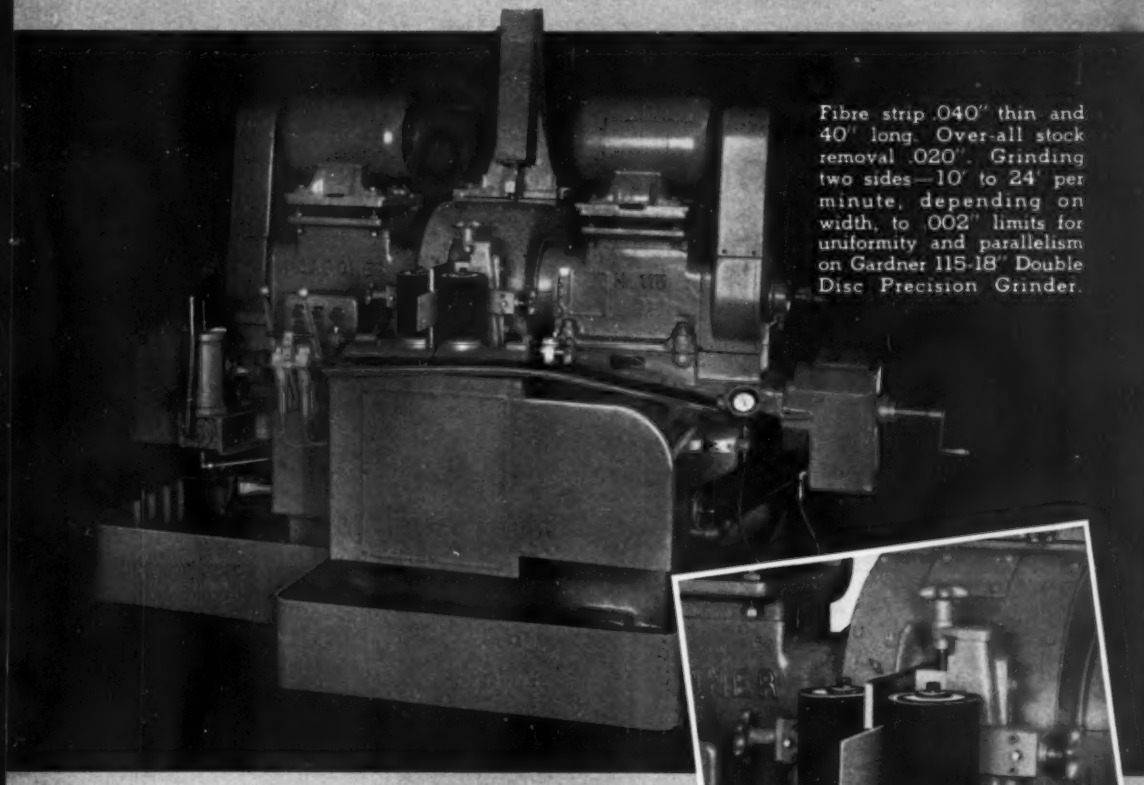
Now

Grind Parallel Sides of .040" Thin Strip at Low Unit Cost

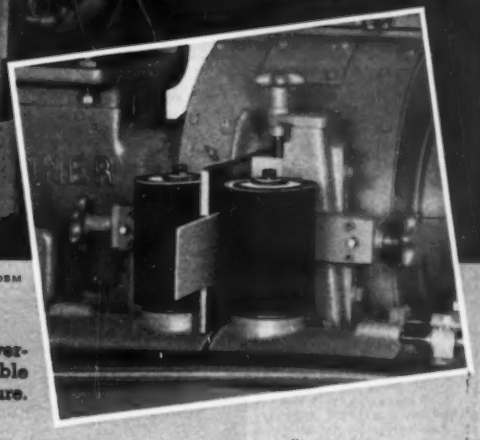
GARDNER

precision disc Grinders

Production increased by grinding TWO surfaces in ONE operation



Fibre strip .040" thin and 40" long. Over-all stock removal .020". Grinding two sides—10' to 24' per minute, depending on width, to .002" limits for uniformity and parallelism on Gardner 115-18" Double Disc Precision Grinder.



Hand feed to power-operated adjustable roll feed-thru fixture.

10BM

Request bulletin No. 12-7.

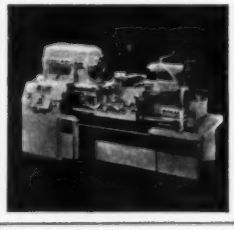
GARDNER MACHINE COMPANY

410 East Gardner Street • Beloit, Wisconsin, U.S.A.

Keep in Step with Monarch and Keep Ahead of Obsolescence

13" MODEL 70 TOOLMAKER'S LATHE

The lathe that has everything. The ultimate for master toolmakers. Unequalled for accuracy, speed and convenience of operation. Features include—speed range of 12 to 2000 R.P.M., develops up to 20 H.P. depending on speed, four directional rapid traverse and built-in constant surface cutting speed. Tailstock hydraulically operated and easily repositioned.

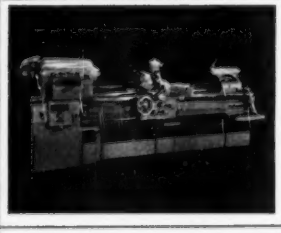


SERIES 60 ENGINE AND TOOLMAKER'S LATHES

In 12", 14", 16" and 20" swings. Offering such typical Monarch features as totally enclosed end gearing and gearbox—automatic pressure lubrication—all anti-friction bearings—hardened helical gears in headstock—American Standard Camlock Spindle Nose—flame-hardened and ground integral bedways—hardened alloy steel working parts.

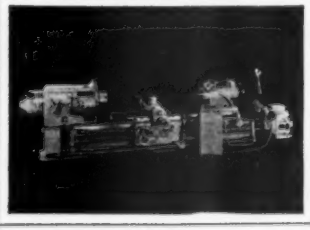
THE AIR-GAGE TRACER

Turn, bore or face using a flat or a round template. With or without fully automatic cycle and infinitely variable feed. Applicable to complete range of sizes from 10" to 32" swing.



ROLL TURNING LATHES

For the contour turning of steel mill rolls from a template. Reduces turning time up to as much as 75 to 85%. Closer accuracy which can always be duplicated exactly. Eliminates the need for hundreds of expensive form tools. Much easier to operate than conventional roll turning lathes.



THE MONARCH New Development Building—where tomorrow's lathe developments are planned today!

WHEN YOU LOOK more closely at the Monarch lathes below, there are two important points to keep in mind. First, you'll find in them every desirable production and design feature required to meet the highest standards—features playing a basic performance part in a line of lathes noted for improved accuracy, faster production and longer life. Secondly, it will pay you to remember that, while many of these features are now standard in the industry, *every one of them was developed and first introduced on Monarch turning equipment.*

MONARCH USERS, in other words, have through the years been first to benefit from each of these developments. And they've benefitted doubly. Through cost reduction and product improvement on one hand. On the other, through the purchase of lathes destined for a longer, unrivalled production life.

AS A MONARCH BUYER TODAY, you face the same enviable prospect. Our company, founded in 1909 and built on the principle of continuous research and development, devotes a major portion of its energies today to that principle. Our New Development Building, with its equipment and staff, is the physical symbol of our determination that the lathe improvements of tomorrow will appear first on Monarch products. It implements our promise that you can always rely on Monarch for the turning equipment to assure you peak production at minimum cost to keep you ahead of the parade . . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

TOOLMAKER'S LATHES • ENGINE LATHES • TRACER-CONTROLLED PRODUCTION LATHES

ROLL TURNING LATHES • AIR-GAGE TRACER, MOTOR-TRACE & KELLER CONTROLS

Monarch

ACCURACY • ECONOMY • LONG LIFE

TURNING MACHINES

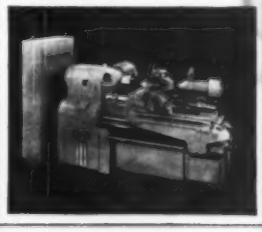
FOR A GOOD TURN FASTER . . . TURN TO MONARCH

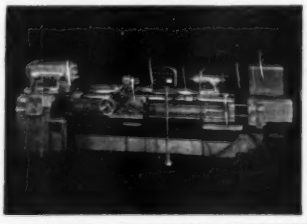
THE SHAPEMASTER ENGRAVER

Here is a lathe that reduces the expensive and time-consuming art of hand engraving to the speed and repetitive accuracy of machine tool operation. Will reproduce any design detail which can be touched by the sharp point tool employed. A cost reducer of great importance for the producing of intricate molds in the glass, plastics and mechanical rubber industries.

THE MONA-MATIC

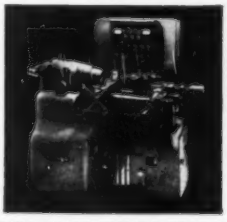
A new and outstanding successful approach to production metal turning. Use of a single running tool speeds production, slashes tool costs, tool change time, and setup time, increases accuracy and often halves time required for subsequent grinding operations. Available with magazine load.





MOTOR-TRACE CONTROLS

The ideal tracer control for most step shaft work. This, with the "Air-Gage Tracer" and Keller Controls, provides Monarch users with a choice of either one of three distinct types of tracer control.

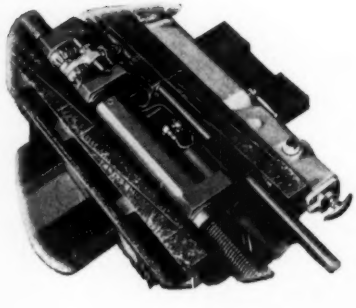


THE SPEEDI-MATIC

A fast, precision, electronically controlled hand screw machine. Short setup time makes it practical for quantities of 25 or less—up to 3000 or more. As many as nine different speeds and six different feeds may be preselected to become operative at proper time in cycle. Suitable for first or second operation work. Speed range—40 to 4000 R.P.M.

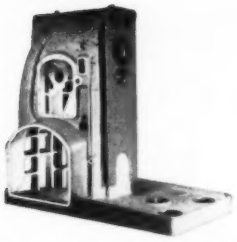
A new line of Knee-Type Milling Machines

KEARNEY & TRECKER MILWAUKEE **CK's**

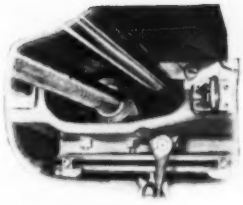


Part by part — unit by unit — Kearney & Trecker's new CK milling machines are built to give you the maximum in *Greater Machine Life.* Generously proportioned gears and shafts, plus automatic, positive lubrication easily meet overload conditions. Every component is engineered to provide the kind of rigidity and resistance to wear that the greater horsepower and heavier cutting loads of modern milling methods require. For fullest protection, column and knee are forced flood lubricated. A positive, metered, pressure system takes care of table, saddle and knee ways and table feed assembly. Add Greater Machine Life to all the other great new CK features and you'll see why these new CK's are the most productive, most profitable milling machines you can buy today — anywhere!

Replacement of obsolete machine tools is an



GREATER RIGIDITY — Yes, these new CK columns are the most rigid milling machine columns we've ever designed! They give you 1000 pounds more metal scientifically distributed in heavier ribbing, box section, sponson construction . . . to effectively absorb vibration from heaviest cutting loads.

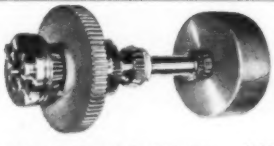


SMOOTHER FEED PERFORMANCE — with a new design 2" diam. heavy-duty, table feed screw that affords greater bearing contact and runs through an extra-long table feed nut. These new CK machines are equipped with a backlash eliminator for more effective climb milling, more accuracy and longer screw life.

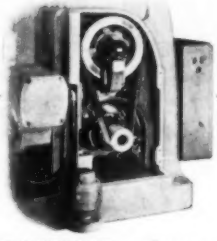
GREATER ADAPTABILITY — No. 60 Heavy Duty drive flange on Nos. 4, 5 and 6 machines enables use of heavy duty arbors with flange drive for large single or multiple cutter setups; or bolting large face-milling cutters directly to spindle nose. Average setups use standard arbors with No. 50 spindle drive.

NON-GLARE RAPID-SET DIALS—You'll avoid costly errors in reading and setting these new micrometer dials. They're vapor blasted to give you a satin surface with high contrast markings. They're easy and quick to set and provide positive lock at every setting.

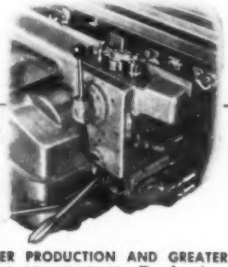
FEEDS AND SPEEDS TO TAKE FULL ADVANTAGE OF MODERN CUTTING TOOLS — and you really can do it with the broad feed and speed ranges on Kearney & Trecker's new CK milling machines. You get 24 spindle speeds (15 to 1500 rpm on Nos. 2 and 3, 13 to 1300 rpm on Nos. 4, 5 and 6) with Kearney & Trecker's automatic protecto-mesh shift to eliminate gear clashing. And there's the extra-wide feed range — 32 changes from ¾" to 90" per minute—with separate 3 or 5 hp feed and rapid traverse drive.



GREATER CUTTING EFFICIENCY — Added momentum of spindle-mounted flywheel assures longer cutter life and greater efficiency, through smoother, more positive drive — a key to most efficient use of modern cutting tools. Spindle rigidly supported by Kearney-& Trecker's original 3-bearing design.



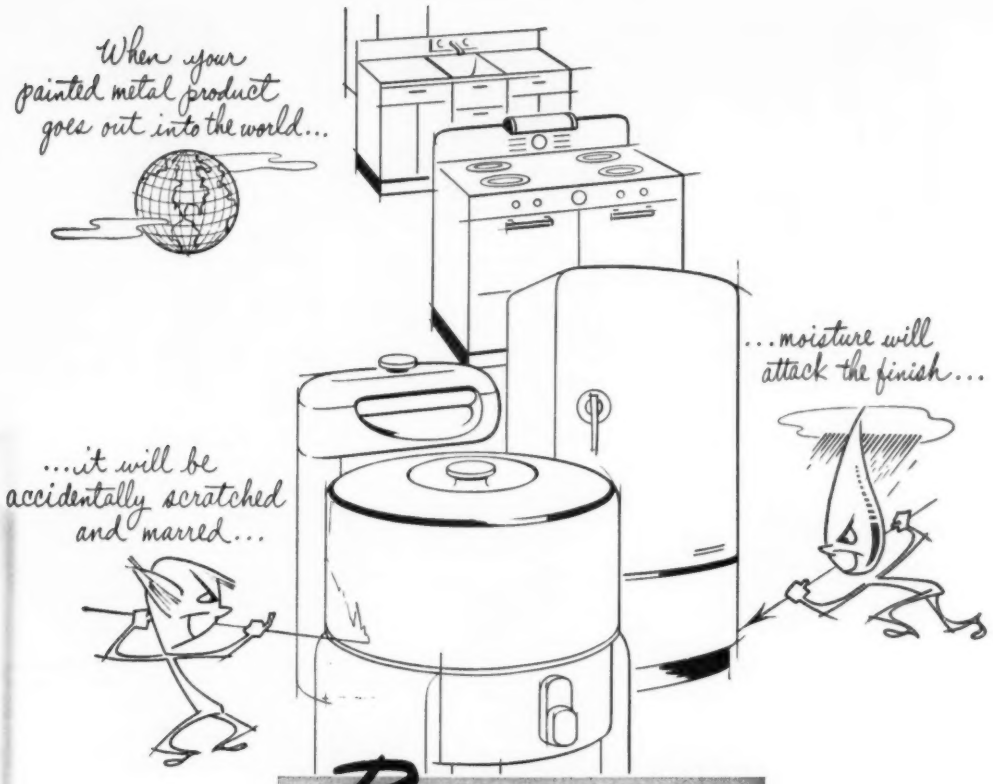
GREATER HORSEPOWER — where you need it. That's what you get with new CK independent motor drives for spindle and for feed and rapid traverse. Depending on machine size (Nos. 2, 3, 4, 5 or 6), machines range from 10 to 25 hp for spindle drive and 3 to 5 hp for feed and rapid traverse.



GREATER PRODUCTION AND GREATER OPERATING CONVENIENCE—Production men will like Mono-Lever Control because it reduces idle cutter time, shortens floor-to-floor cycle time on both long and short run lots. Operators will like it because it makes faster, simpler, less fatiguing work for them.

Kearney & Trecker's new CK line of knee-type machines is designed to meet every demand of present-day milling . . . making them more accurate, and MORE PRODUCTIVE for you. Contact your Kearney & Trecker representative or write direct to obtain their complete specifications. Find out how CK machines easily replace obsolete machines at substantial savings to you. Kearney & Trecker Corp., 6784 N. National Ave., Milwaukee 14, Wis.

investment that makes Dollars and Sense.


When your painted metal product goes out into the world...
...it will be accidentally scratched and marred...
...moisture will attack the finish...

Better put BONDERITE under the paint to guard the finish and keep your product looking its best!

This is the corrosion resistant paint base that's doing a big job for manufacturers of painted metal products. On finished products from automobiles through the list to kitchen food mixers, Bonderite under the paint adds qualities that protect the paint finish, prolong fine appearance, promote customer satisfaction.

Bonderite is dependable, uniform, simple to control, adaptable. Its cost is low for the benefits it delivers.

Your product should have the protection of Bonderite. Write for full information.

Bonderite, Parco, Parco Lubrite—Reg. U.S. Pat. Off.

PARKER

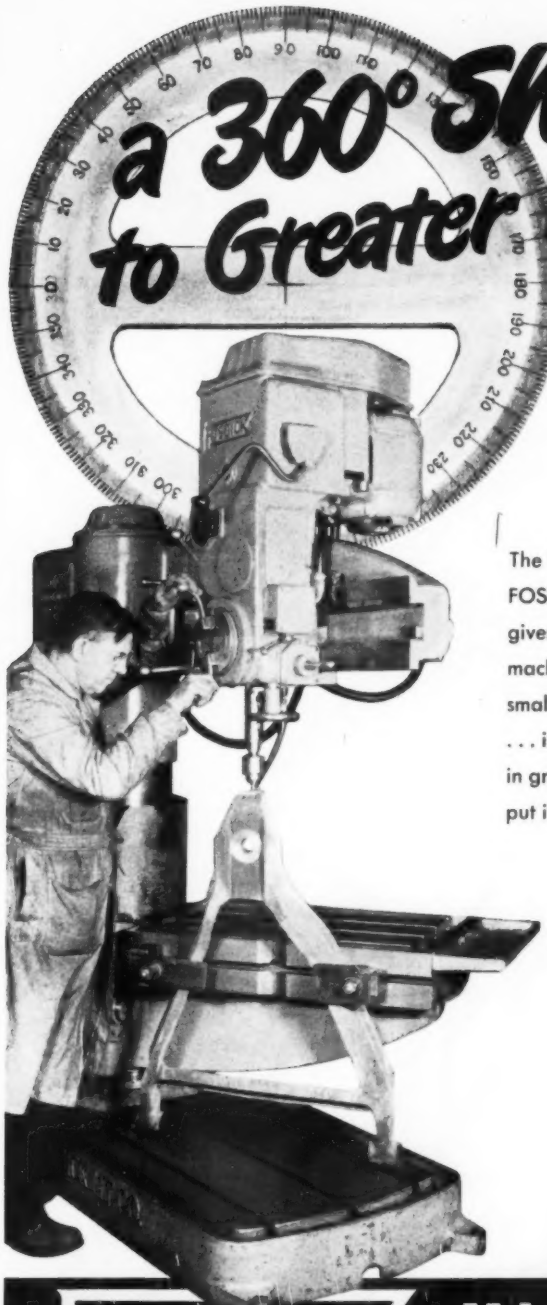
PARKER RUST PROOF COMPANY
2196 East Milwaukee Ave.
Detroit 11, Michigan

BONDERITE—Corrosion Resistant Paint Base • PARCO COMPOUND—Rust Resistant • PARCO LUBRITE—Wear Resistant for Friction Surfaces

a 360° SWING to Greater Productivity

with a

FOSDICK *Sensitive* RADIAL



The fact that both the arm and the table of the FOSDICK Sensitive RADIAL swing in a 360° arc gives it flexibility that can't be found in any other machine of its type. No matter how big, how small or how intricate your drilling job may be . . . it can be done easier and faster . . . resulting in greater productivity and bigger savings if you put it on a FOSDICK Sensitive RADIAL.

Other time saving, cost saving features of this unique machine tool include:

- Adjustable elevating table which slides smoothly on a sturdy one piece column, placing the work in proper location to the spindle at all times . . .
- Arm at fixed height is easily reached from operator's normal position . . .
- The massive head provides nine speeds and four feeds . . .
- Control levers for both feeds and speeds are direct reading and right at the operator's fingertips.

For complete information on this new, versatile machine write for FOSDICK Sensitive RADIAL Bulletin SRA.

FOSDICK MACHINE TOOL CO.
CINCINNATI 23, OHIO

It's
MORSE
MORSE
MORSE
MORSE

the Shear Cut

of the MORSE "Hi-Helix" Design . . . that Really Cuts Your End-Milling Costs!

CHIPS CAN'T CLOG THE FLUTES of Morse End Mills made to this exclusive design. For the shear-cutting action clears the chips in a smooth, even flow. Cutting is far faster . . . tool-life far longer. And to get even longer tool-life, specify Morse Electrolized End Mills.

Morse Hi-Helix End Mills are precision-made . . . with 2 flutes for hogging . . . 4 or more for finishing. *See your Morse-Franchised Distributor.* He's the only one who can give you Morse-Quality for *every* type of end-milling job. He has the experience . . . and a complete Morse stock . . . to serve you promptly and well at all times.

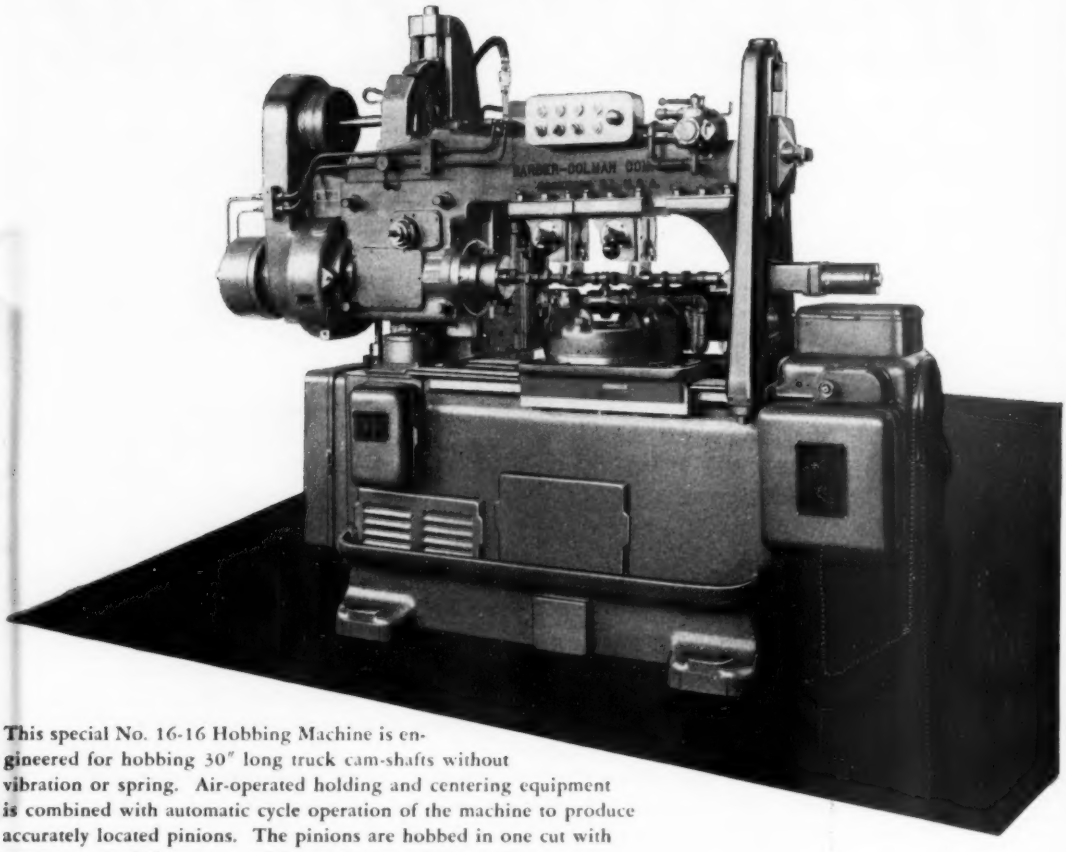
Morse Twist Drill & Machine Co., New Bedford, Mass., *(Div. of Van Norman Co.)*
Warehouses in New York, Chicago, Detroit, San Francisco

MORSE
Cutting Tools

Barber-Colman

No. 16–16 HOBBING MACHINES

HOB LONG CAM-SHAFTS ACCURATELY — 41 PER HOUR



This special No. 16-16 Hobbing Machine is engineered for hobbing 30" long truck cam-shafts without vibration or spring. Air-operated holding and centering equipment is combined with automatic cycle operation of the machine to produce accurately located pinions. The pinions are hobbed in one cut with maximum pitch line concentricity at the rate of 41 per hour.

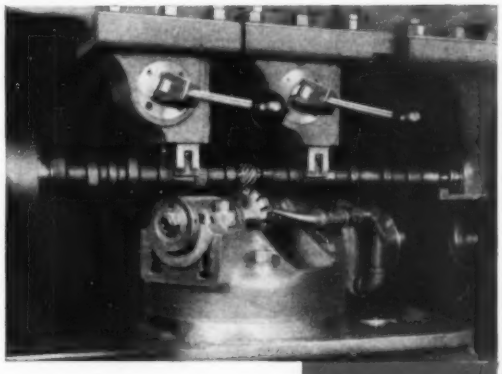
COMPLETE GEAR HOBBING SERVICE

BARBER COLMAN

HOBS • MACHINES • SHARPENING • TECHNICAL DATA

BUILDERS OF PRECISION GEAR

ONE-CUT FINISH HOB PINIONS TO .002" P. D. RUNOUT. AUTOMATIC CYCLE PRODUCES 41 SHAFTS PER HOUR



Quick loading is accomplished by air control. One end of the shaft is held in the air operated collet, and the other end is supported in the cradle at the bottom of the front center bracket. When the Air Control Valve is energized the shaft is centered, properly located and seated against a stop in the collet. Delayed action closes the collet after seating and locating have been accomplished. Manual or air operated steadyrests prevent any bend or vibration in the shaft due to the action of the hob. Tool life is approximately 175 pieces per sharpening.

When the operator presses the "Start" button, the automatic hobbing cycle engages the vertical cam feed which lowers the work onto the hob. Only plunge feed is used — no horizontal feed. After the hob has reached full depth, the work slide raises automatically to its starting position, and the machine is stopped. A pressure control safety device protects the operator in the event of a casualty in the air pressure system.

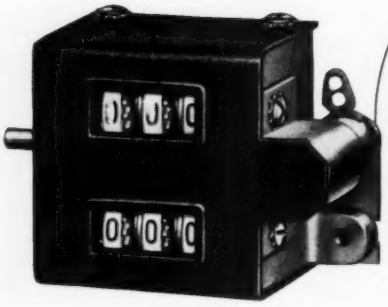
This cam-shaft pinion requires precision accuracy for proper operation of the truck motor. Barber-Colman No. 16-16 Hobbing Machines successfully combine this essential accuracy with operator convenience and high output. They do this requiring the least amount of man-motion and effort.

That's where Barber-Colman Hobbing can help you with your "special" gear problems. Let the machine and equipment handle the job requirements. Then the operator has only to load and unload, thereby obtaining maximum production for your capital investment.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 134 ROCK STREET, ROCKFORD, ILLINOIS, U.S.A.

HOBS AND MACHINES SINCE 1911



"Round and round and round they go—and what they count: only radarmen know!"

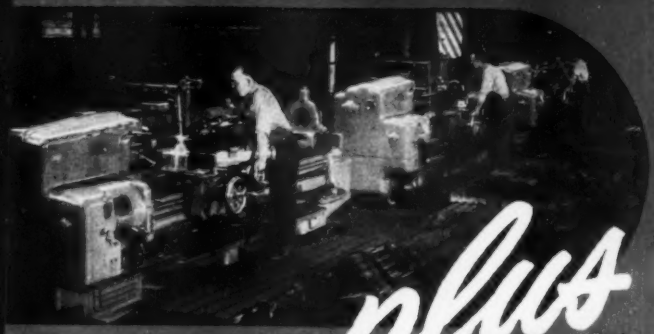
Everyone Can Count on VEEDER-ROOT

Yes, this time as before, every arm of the service counts on Veeder-Root in some way or other. The counters shown, for instance, supply figures that radarmen readily translate into vital information.

And there are scores of other Veeder-Root Counters, standard and special, electrical and mechanical, that "talk the language" of more military and civilian jobs than you can shake a slide-rule at!

VEEDER-ROOT INC.
HARTFORD 2, CONN. • GREENVILLE, S. C.
Montreal, Canada Dundee, Scotland
Offices and agents in principal cities

VEEDER-ROOT COUNTERS *"Count Everything on Earth"*



plus 3 minus 7

A Profitable Investment for *any* plant!

The world-renowned Otis Elevator Company recently installed three "AMERICAN" Duplicator Lathes which replaced seven engine lathes.

Such savings are the rule—not the exception—when "AMERICAN" Duplicators are put on the job.

These machines are performing "miracles" in savings in many of the largest and best known units of the metal working industry. They have introduced a new machining technique that has revolutionized the art of turning metal.

They reproduce work shapes from a template faithfully and accurately. They reproduce steps, tapers, right angle and tapered shoulders, recesses, grinding necks and radii, and are especially productive on such work as spindles, motor shafts, valve stems, back shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

More and more the necessity of reducing manufacturing costs is crystallizing in the minds of management. The attention of directors, top officials and especially production executives is being focused to an increasingly greater degree upon cost-cutting equipment. It is inevitable, therefore, that the "AMERICAN" Hydraulic Duplicating Lathe should command the spotlight. Evidence from a hundred installations proves beyond a shadow of a doubt their leadership as top flight cost reducers.

If it's proof you want just drop us a line—no obligation.

THE AMERICAN TOOL WORKS CO. **Cincinnati, Ohio U.S.A.**

Lathes and Radial Drills

WINTER "BALANCED ACTION" TAPS

For SPECIAL APPLICATIONS

If you do tapping in plastics, aluminum, cast iron, brass, or any other special applications, you will be interested in this new 20-page booklet. It describes the various kinds of Winter Taps designed for unusual types of work, giving the recommended tapping speeds and tapping lubricants for various materials. A free copy may be obtained from your Winter distributor. In addition to taps for special applications, Winter makes a complete line of standard taps, including chip driver, hand, machine screw, pipe, pulley, nut, and tapper taps.

WINTER

ALWAYS AT YOUR SERVICE

YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as the telephone on your desk.

WINTER BROTHERS COMPANY • Division of the National Twist Drill and Tool Company, Rochester Michigan, U.S.A. • Distributors in Principal Cities • Branches in New York, Detroit, Chicago, San Francisco

A FRIEND IN NEED...
The NATIONAL
Service Engineer

Have you a special problem in drilling, milling, hobbing, or other operations involving the use of rotary metal cutting tools? If so, you'll find the National Service Engineer a real friend in need. He will put at your disposal all his specialized training and day-to-day experience in helping users make tools last longer and do better, faster work. No charge or obligation, of course. To contact him call your distributor.

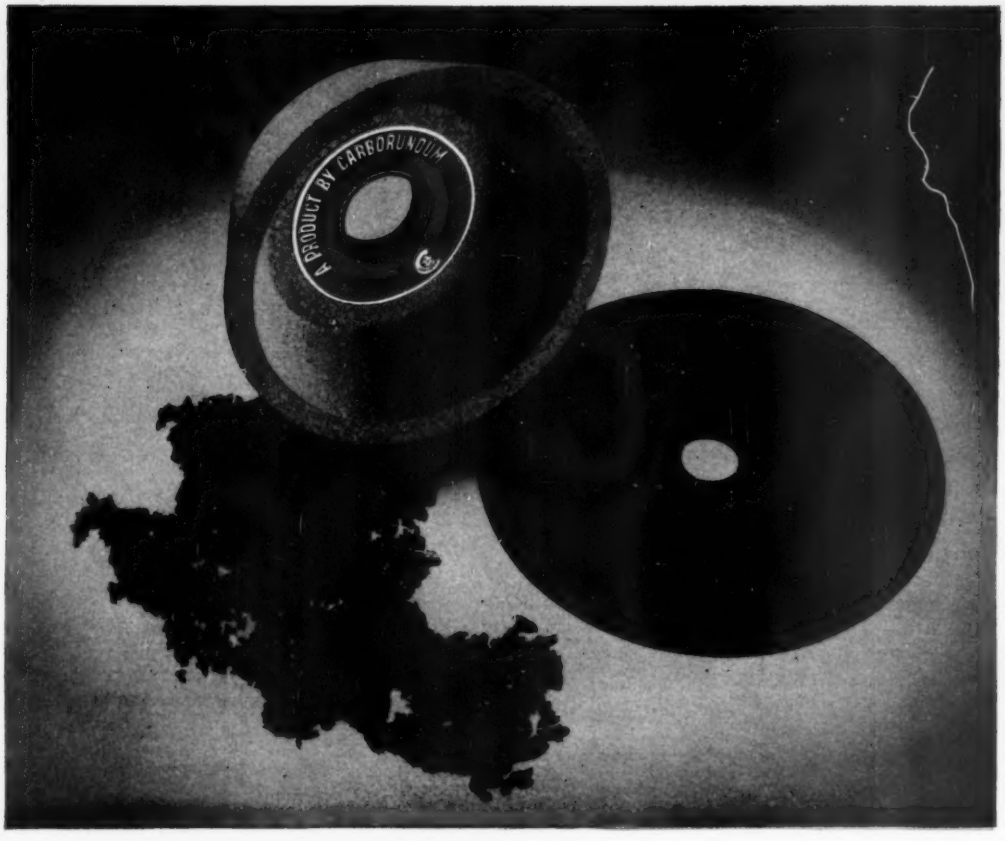
"CALL YOUR DISTRIBUTOR"

It is NATIONAL'S firm belief, based on long experience, that the local industrial distributor is the one best source for all staple industrial needs — including NATIONAL Metal Cutting Tools.

NATIONAL TWIST DRILL & TOOL — ROCHESTER, MICH. U.S.A.

National

NATIONAL TWIST DRILL AND TOOL COMPANY • Rochester, Michigan, U.S.A. • Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco



Which would you use?

Abrasive wheel, belt or grain—which would you use on any specific metalworking operation? The choice, of course, depends on the material to be removed, desired finish, cost factor and other variables.

Equally important it depends on *improvements in abrasive products and methods* which can make a change to a different type of abrasive advantageous for particular applications.

That's why it pays to standardize on a brand name covering all types of abrasives, from which impartial recommendation of the proper one can be made. Only CARBORUNDUM offers that advantage: a *complete* line of abrasive products from which you can obtain the one best suited to individual job requirements, in every case.

Get the most in production efficiency and economy—by specifying abrasives from the *complete* CARBORUNDUM line.

Only CARBORUNDUM

TRADE MARK

makes ALL Abrasive Products...to give you the proper ONE

"Carborundum" is a registered trademark which indicates manufacture by The Carborundum Company, Niagara Falls, N. Y.

80-10

Productivity
...from Brown & Sharpe

"Fool-proof" Precision Gaging at Mass-Production Speed!

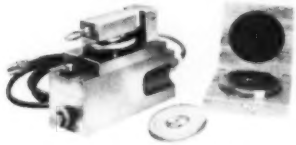
Brown & Sharpe Electronic Measuring Equipment now permits precision small-parts gaging and inspection to be done *with human error practically eliminated!*

This ultra-modern equipment amplifies gage measurements 1800 to 18,000 times . . . enables operators to read ten-thousandths as easily as inches, and as fast as parts can be handled. It maintains uniform quality output, cuts costs, prevents inspection "bottle-necks."

Unique engineering simplicity gives this electronic gaging equipment simpler, sturdier construction; more-stable adjustments; easier manipulation.

Supplied with stock External or Internal Comparators . . . or with custom-built fixtures employing Gage Head Cartridges for gaging thickness, length, angle, parallelism, diameter, taper or combinations of several dimensions. Write for detailed catalog.

Custom-made fixture, employing Brown & Sharpe Gage Head Cartridge and one amplifier, simultaneously measures major and minor I.D.'s of tapered bores; indicates internal angle accuracy.



Special gaging fixture, custom-made by Brown & Sharpe, permits gaging of meter valve plate flatness to .00001", when used with Brown & Sharpe Amplifier.

Special gaging fixture made by Brown & Sharpe for inspecting dimensions, side parallelism and side squareness of cutter blades. Employs 4 Gage Head Cartridges . . . used with 4 Amplifiers.

Timely equipment for today's conditions . . .

Brown & Sharpe Machines

that prepare you to handle straight, taper and toolroom grinding . . . faster!

With these advanced Brown & Sharpe Grinding Machines, especially when Electralign-equipped, you can be strategically prepared to supply the coming large-quantity demand for precision ground cylindrical parts — either straight or tapered.

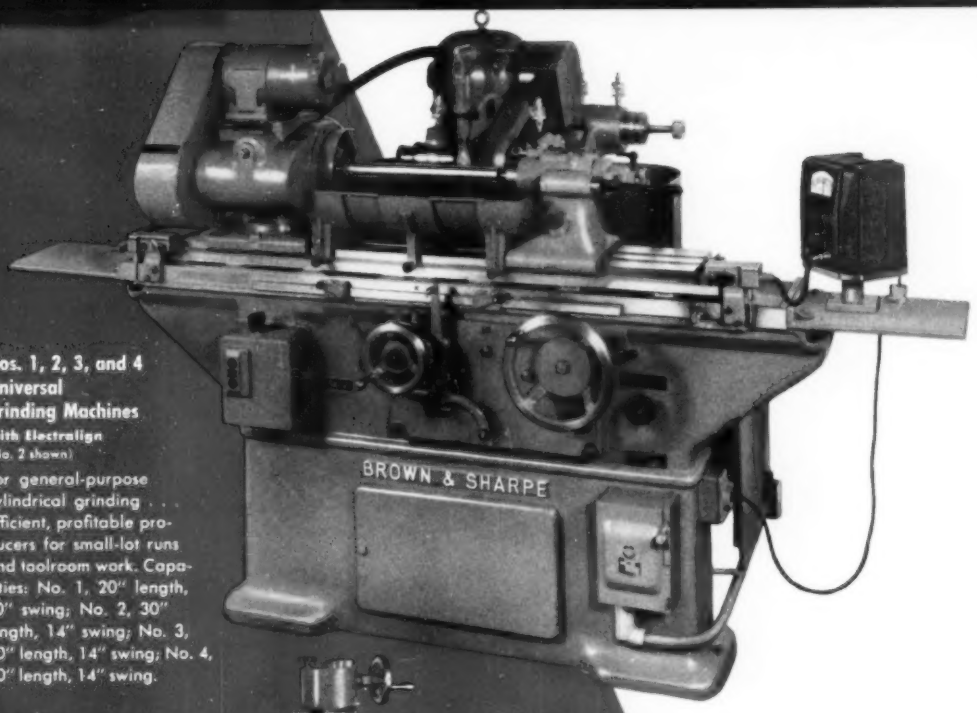
Supplementing the basic speed, accuracy and flexibility of the machines themselves, the revolutionary Brown & Sharpe Electralign now makes grinding of straight work and exact tapers easy and positive. It permits the operator to align the swivel table instantly and accurately after a single preliminary grind . . . saves machine-time and operator's time . . . reduces rejects . . . simplifies training of unskilled operators.

In every detail, these machines are designed for maximum productivity . . . for fast, accurate duplication of parts with greatest ease and assurance for the operator.

Write for detailed literature.

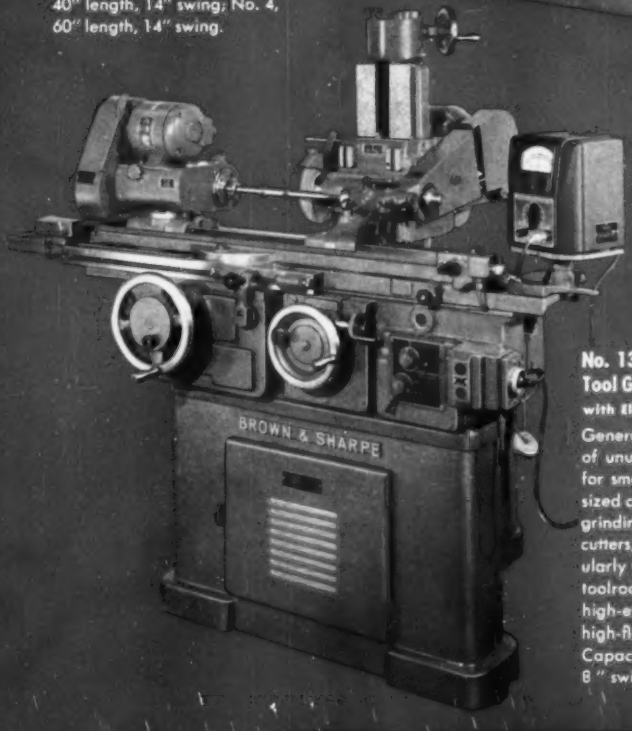
No. 5 Plain Grinding Machine
with Electralign

For rapid cylindrical grinding of small parts on a production basis. Flexible operating controls promote maximum efficiency. Recessed base permits operator to sit at machine. Capacities: 3" x 12" and 3" x 18".



Nos. 1, 2, 3, and 4 Universal Grinding Machines
with Electralign
(No. 2 shown)

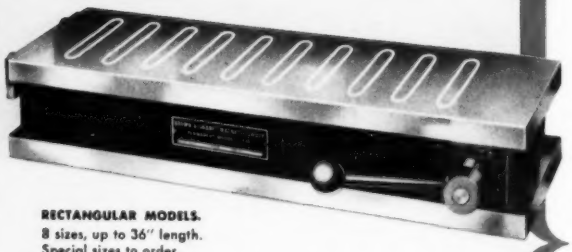
For general-purpose cylindrical grinding . . . efficient, profitable producers for small-lot runs and toolroom work. Capacities: No. 1, 20" length, 10" swing; No. 2, 30" length, 14" swing; No. 3, 40" length, 14" swing; No. 4, 60" length, 14" swing.



No. 13 Universal and Tool Grinding Machine
with Electralign

General-purpose machine of unusually broad utility for small and medium sized cylindrical work, form grinding, sharpening cutters, reamers, etc. Particularly valuable for putting toolrooms on new high-efficiency, high-capacity, high-flexibility basis. Capacity: 24" length, 8" swing.

Brown & Sharpe B·S



RECTANGULAR MODELS.
8 sizes, up to 36" length.
Special sizes to order.

ROTARY MODELS.
3 sizes, 5", 7", 9" dia.
Special sizes to order.

SAVE TIME TO PRODUCE MORE

with Permanent Magnet Chucks

A simple turn of a lever is all that's needed to secure work to Brown & Sharpe Permanent Magnet Chucks. No handling or adjusting of jigs, fixtures or clamping tools. No electrical connections required. The time saved shows up in higher production.

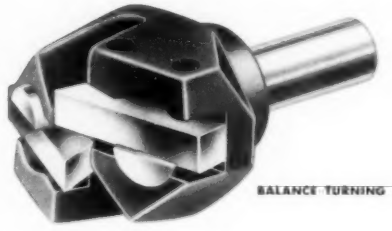
Permanent Magnet Chucks cost nothing to operate — last indefinitely. Hold as long as desired without heating or loss of power. Available in broad line of rectangular and rotary models. Write for complete catalog.

REDUCE SET-UP TIME... INCREASE PRODUCTION

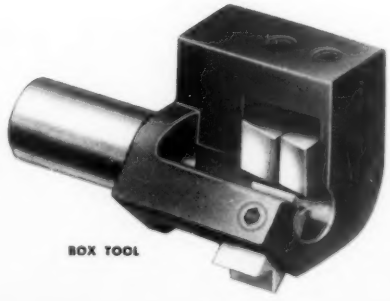
with Brown & Sharpe Screw Machine Tools

You can set up your screw machines faster and keep tools working longer and producing more between sharpenings, if the tools are *right* for the job they're doing. And the easiest way to insure getting the *right* tools is to make your selection from the complete range offered by Brown & Sharpe.

Brown & Sharpe Screw Machine Tools are simple and convenient, combining maximum rigidity and compactness. Complete range of types and sizes available. Designs undergo constant test-proving in the Brown & Sharpe plant where over 300 screw machines are in daily operation. Write for catalog.



BALANCE TURNING TOOL



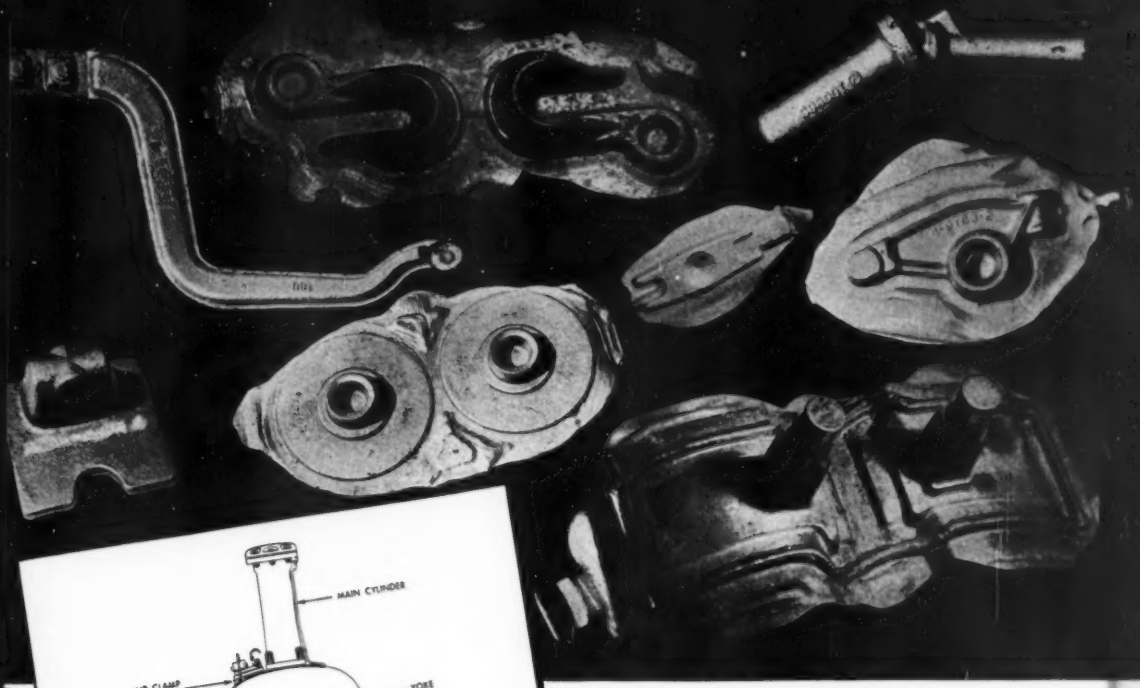
BOX TOOL

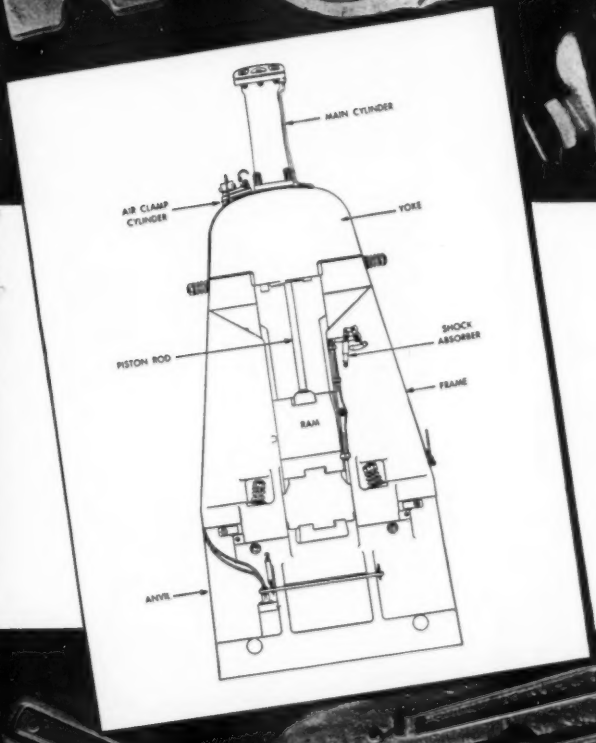
WE URGE BUYING THROUGH THE DISTRIBUTOR

Brown & Sharpe

Milling Machines · Grinding Machines · Screw Machines · Cutters · Machine Tool Accessories
Machinists' Tools · Electronic Measuring Equipment · Johansson Gage Blocks · Permanent Magnet Chucks

BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.





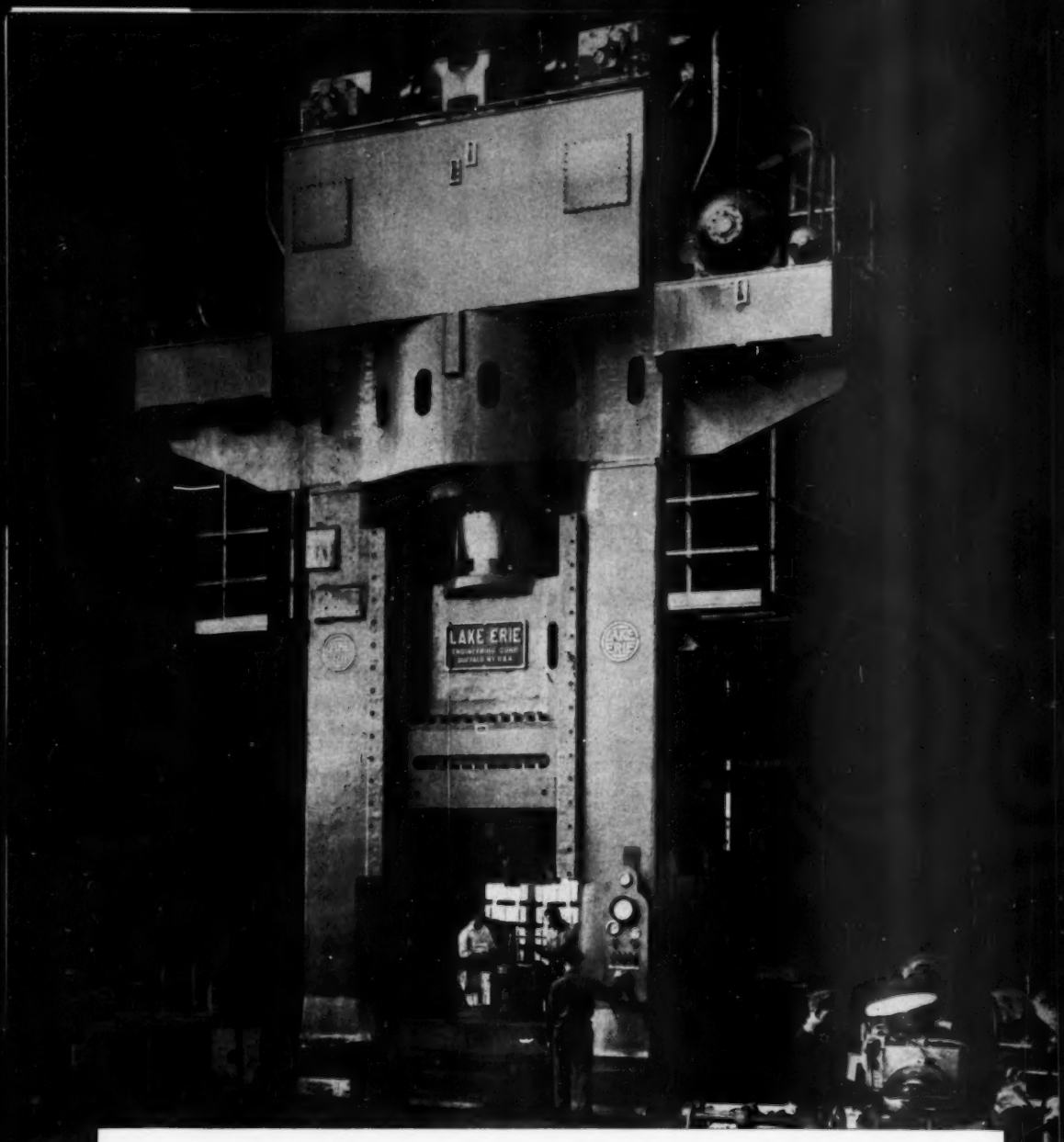
MANY FORGINGS CAN BE MADE FASTER, CHEAPER, MORE ACCURATELY ON THE CECO-DROP

The rapid striking action of the Ceco-Drop, the quick get-away of the ram after striking and the low center of gravity, insuring accuracy of die match, are a few of the reasons why forgings like these have shown increased production, more uniform accuracy and lower costs when transferred from other gravity drop hammers to Ceco-Drops. ***Write for Bulletin 30-L-0.***

CECO-DROP

• *The Boardless Gravity Drop Hammer* •

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.



FIRST PRESS DESIGNED AND MANUFACTURED IN THE UNITED STATES FOR THE COLD EXTRUSION OF STEEL

● Developed by Lake Erie Engineering Corporation in collaboration with Mullins Manufacturing Corporation of Salem, Ohio.

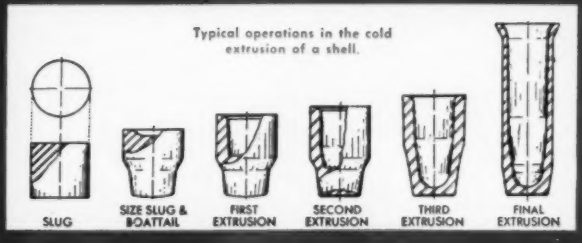
Press has a bed area 72″ x 60″, 108″ daylight opening and 60″ stroke. It stands 35′ 9″ above the floor and extends 21′ below the floor, where a 250 ton hydraulic ejector is located in the bed of the press. The press weighs over 700,000 pounds and is complete with a high-speed self-contained pumping unit, powered by 900 HP motors. Many of these specifications are in excess of those required for production equipment and are incorporated in the press to provide flexibility for experimental and research work.

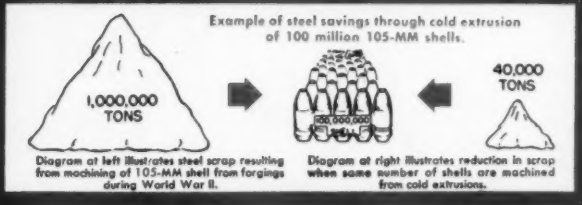
COLD EXTRUSION OF STEEL...

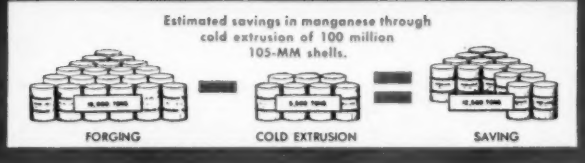
creates new opportunity for industry

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

Tremendous savings in metal and machining plus superior characteristics of end products made possible by new developments.




Example of steel savings through cold extrusion of 100 million 105-MM shells.
1,000,000 TONS
40,000 TONS
Diagram at left illustrates steel scrap resulting from machining of 105-MM shell from forgings during World War II.
Diagram at right illustrates reduction in scrap when same number of shells are machined from cold extrusions.



Above diagrams reprinted through the courtesy of General Merle H. Davis and Ordnance Magazine.

IF YOU MANUFACTURE A PRODUCT...

—that resembles a rather thick-walled steel cup or hollow cylinder

—and that calls for fairly high physicals in the final end product

—it will pay you to investigate the remarkable economies made possible by cold extrusion. Besides the unbelievable savings in metal and machining, there are additional benefits such as:

1 Better physical properties through cold working.
2 Superior surface finish.
3 Closer dimensional tolerances.
4 Higher degree of concentricity.
5 Less variation in weight.
6 Elimination of heat treatment.
7 Reduction of inclusions, porosity and stringers.

If you manufacture a steel product of a type suitable for cold extrusion, write us. We will assist you without obligation in determining the economies and advantages of the process for your product.

LAKE ERIE ENGINEERING CORP.

MANUFACTURERS OF
HYDRAULIC PRESSES AND SPECIAL MACHINERY

★

General Offices and Plant:
507 Woodward Avenue, Buffalo 17, N. Y.

DISTRICT OFFICES IN NEW YORK, CHICAGO AND DETROIT

Representatives in Other Principal Cities in the United States and Foreign Countries

Manufactured in Canada by: Canada Iron Foundries Limited

LAKE ERIE

LEADING MANUFACTURERS OF HORIZONTAL AND VERTICAL HYDRAULIC EXTRUSION PRESSES FOR STEEL...BRASS... COPPER...ALUMINUM...LEAD PIPE...SOLDER...LEAD ENCASING...SPECIAL ALLOYS...CARBON...AND OTHER MATERIALS

S-U-P-E-R-I-O-R-I-T-Y

Bay State's phenomenal growth has been no accident. It has resulted from a completely modern application of a greater ceramic and technical "know-how".

. . . rigid laboratory control of all raw materials.
. . . up-to-the-minute plant equipment.
. . . exclusive advantages of Fractional Grades & Controlled Porosity.
. . . improved heat resistant organic bonds.
. . . competent technically trained abrasive & ceramic engineers.
. . . superior quality control.
. . . exact duplication from order to order.

BAY STATE

Top Performance Consistently Duplicated

SPELLS GROWTH!

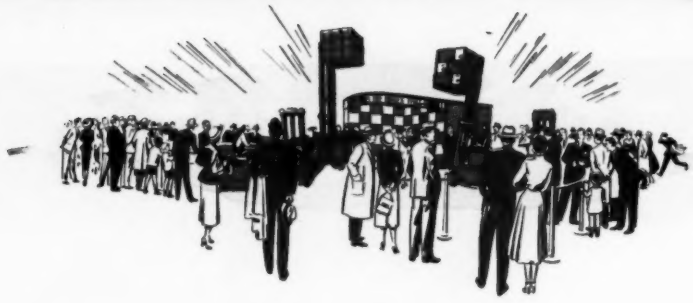
These features combined with countless others found in every BAY STATE product constitute the formula for consistently increased productivity in innumerable everyday grinding jobs.

It is not surprising that an ever-increasing number of men who know grinding wheels best, Operators, Tool Room Foremen and Purchasing Agents, are specifying BAY STATE.

Branch Offices and Warehouses — Chicago, Cleveland, Detroit, Pittsburgh
Distributors — All principal Cities
In Canada: Bay State Abrasive Products Co. (Canada) Ltd., Brantford, Ontario

BAY STATE

BAY STATE ABRASIVE PRODUCTS CO., WESTBORO, MASS.



At the Materials Handling Exposition
you'll see for yourself...

YALE MAKES THE MOVES THAT COUNT

...moves that will help you jump production, save men, bring planned efficiency to your entire operation!

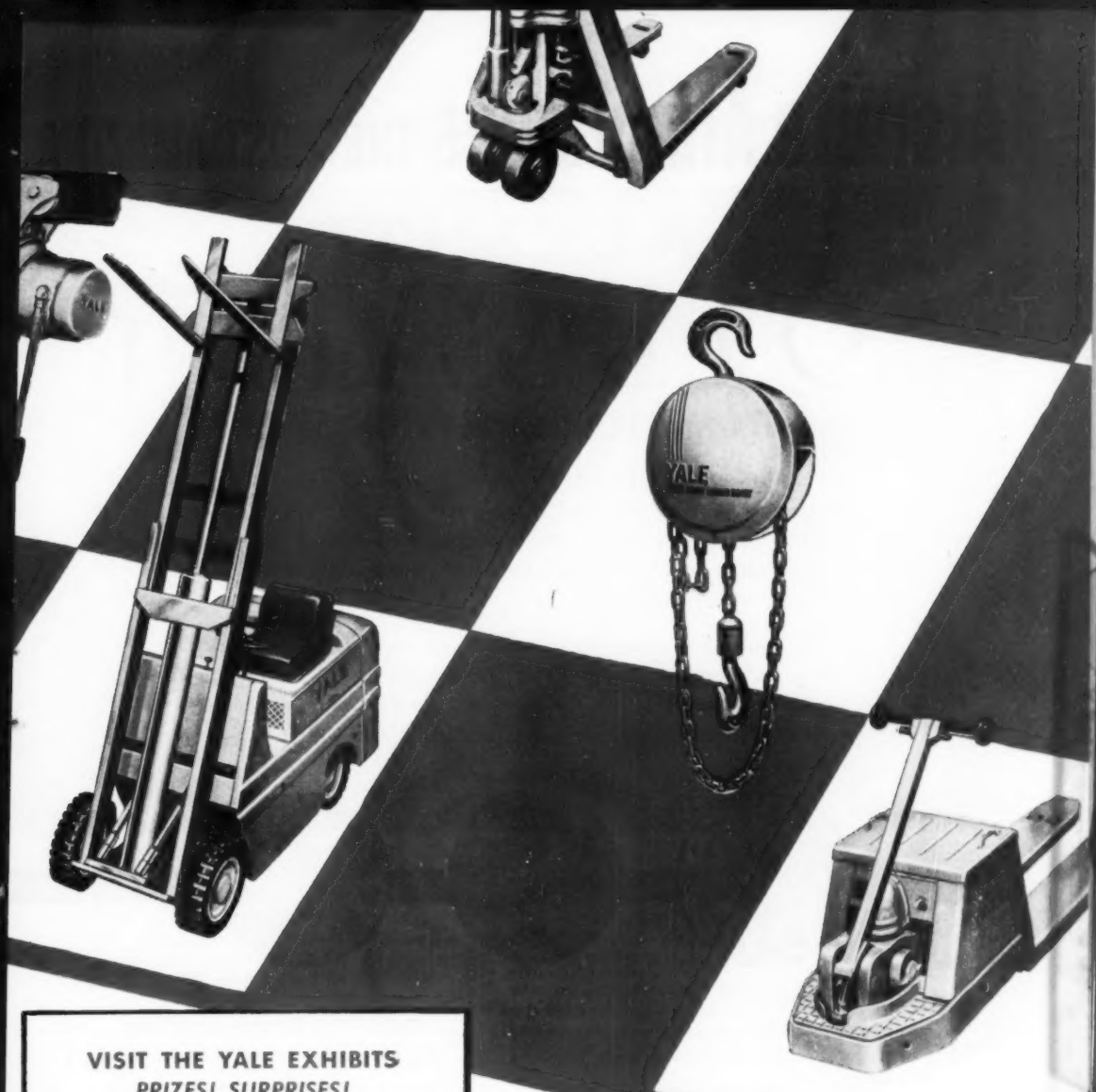
See for yourself... Watch YALE equipment *in action* at the Materials Handling Show—demonstrating the newest money-saving techniques in materials handling, giving you concrete ideas for stepping up production, supplying on-the-spot *proof* that YALE makes the moves that count!

You'll be convinced that YALE builds the equipment that will *do more work for you*—equipment that's *exactly right for your job*. That's because YALE makes many kinds of equipment and can impartially recommend the best type for your precise needs.

And most important, you can depend on any YALE equipment to *stay* on the job—to take years of hard wear and still produce *and keep producing* with a minimum of down time, replacements and repairs.

If you can't visit the Materials Handling Show, let us send you complete information about the YALE equipment you're most interested in.

- **YALE Gas Trucks**
- **YALE Electric Trucks**
- **YALE Worksavers**
- **YALE Hand Lift Trucks**
- **YALE Electric Hoists**
- **YALE Hand Hoists**



VISIT THE YALE EXHIBITS

PRIZES! SURPRISES!
PROFIT IDEAS FOR YOU!

Indoor Truck Exhibit, Booth 317-324: See more than a dozen different types of trucks demonstrating the most efficient methods of lifting, moving, stacking.

Hoist Exhibit, Booth 123: Lots of money-saving ideas here—at least 10 ways to take the strain out of heavy lifting jobs.

Outdoor Exhibit 701: Here's where you'll see efficient YALE gasoline trucks in action, *proving* what they can do!

YALE & TOWNE

THE YALE & TOWNE MANUFACTURING COMPANY
Philadelphia 15, Pa.

YALE MATERIALS HANDLING EQUIPMENT

YALE is the registered trademark of The Yale & Towne Manufacturing Company

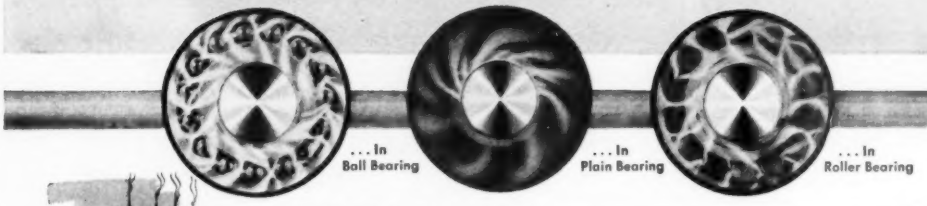
Alemite Announces THE MOST AMAZING

ALEMITE OIL-MIST

AUTOMATIC LUBRICATION SYSTEM

Unbelievably simple system atomizes oil into mist, circulates it through tubing to bearings. Bathes all bearing surfaces with fresh, clean, cool oil film. Uniformly maintains oil film on all sliding, rubbing, rolling parts regardless of variations in load, temperature or speed! No "peaks and valleys" of lubrication.

Fully automatic—eliminates waste and the uncertainties of the "human element." Extends bearing life as much as 17½ times. Seals bearings against dirt and abrasives. Cuts oil consumption as much as 90%. Greatly reduces the number of oils needed.



Here is lubricating progress so major—so far-reaching—as to command the interest of *every* executive concerned with industrial lubrication practices and costs.

You'll marvel that a system so simple—without any moving parts—can bring such a revolutionary change in the lubrication of machinery.

The Alemite Oil-Mist System requires only two simple settings—to control the amount of air pressure, and to regulate the density of the Oil-Mist. Once set, they require no further attention.

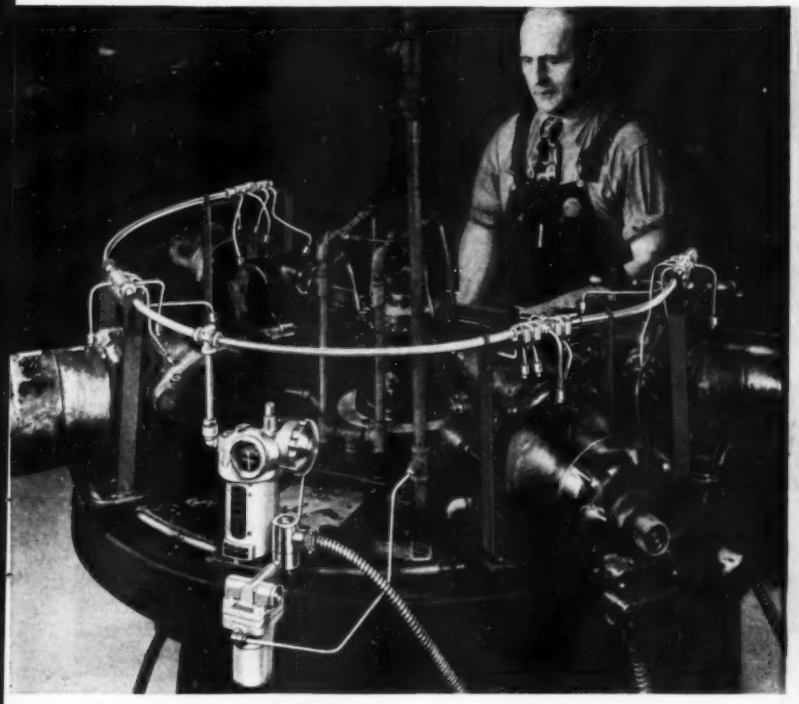
This great new Alemite Oil-Mist System has been proved by plant installations on a wide variety of machines in many industries including steel, coal, food processing, chemicals, metalworking, textiles and woodworking. The results are spectacular—in reduced lubrication costs, reduced maintenance costs, reduced service, reduced "down-time."

Desk-Top Demonstration,

No Obligation—Mail Coupon at Right

The handy coupon attached to your Company letterhead will bring a trained Alemite Lubrication Representative to your office. In a brief yet thorough Desk-Top Demonstration he will answer questions and tell you how Alemite Oil-Mist can provide more efficient lubrication at lower cost than you ever thought possible. Clip and mail the coupon today—to Alemite, Division of Stewart-Warner, 1850 Diversey Parkway, Chicago, Ill.

AUTOMATIC LUBRICATION SYSTEM EVER INVENTED



Here is an example of the many kinds of mechanical motions that can be lubricated by an Alemite Oil-Mist System, *using one oil.* On this automatic drilling machine Alemite Oil-Mist is lubricating 20 points, including cam, quill, worm and gear, reduction gear, gear and rack, gear train, plain and ball bearings. With Alemite Oil-Mist, this machine consumes only 10 oz. of oil during an 80-hour work week. System draws less than ONE cu. ft. of air per minute at 10 psi.

← OIL MIST ← OIL MIST

8 Advantages of the Alemite Oil-Mist System

1. Continuous Lubrication

Constantly deposits a fresh, clean film of oil on all surfaces of all bearings in the system.

2. Fully Automatic Lubrication

Eliminates the uncertainties of the "human element." (Refilling the reservoir is the only periodic service required.)

3. Elimination of Guesswork

Every bearing picks up only as much Oil-Mist as it needs. No bearing can be overlooked. None gets over-lubricated.

4. Reduction of Bearing Temperatures

Oil-Mist acts as bearing coolant, can lower bearing temperatures as much as 20°F.

5. Reduction of Types of Oil

Oil-Mist greatly reduces the number of oils that must be stocked, handled, and applied.

6. Elimination of "Down-Time"

All bearings in the system are constantly lubricated while the machine continues to produce.

7. Extension of Bearing Life

Oil-Mist multiplies the life of bearings many times. The life of grinding machine bearings has been extended from 400 to 7,000 hours.

8. Consumption of Oil Cut 90%

The Oil-Mist System usually consumes approximately 1/10 the amount consumed by any other oiling method.

Alemite OIL-MIST Lubrication

Another Product of STEWART WARNER

Mail this coupon today!

Alemite, Division of Stewart-Warner, Dept. D-41
1850 Diversey Parkway, Chicago 14, Ill.

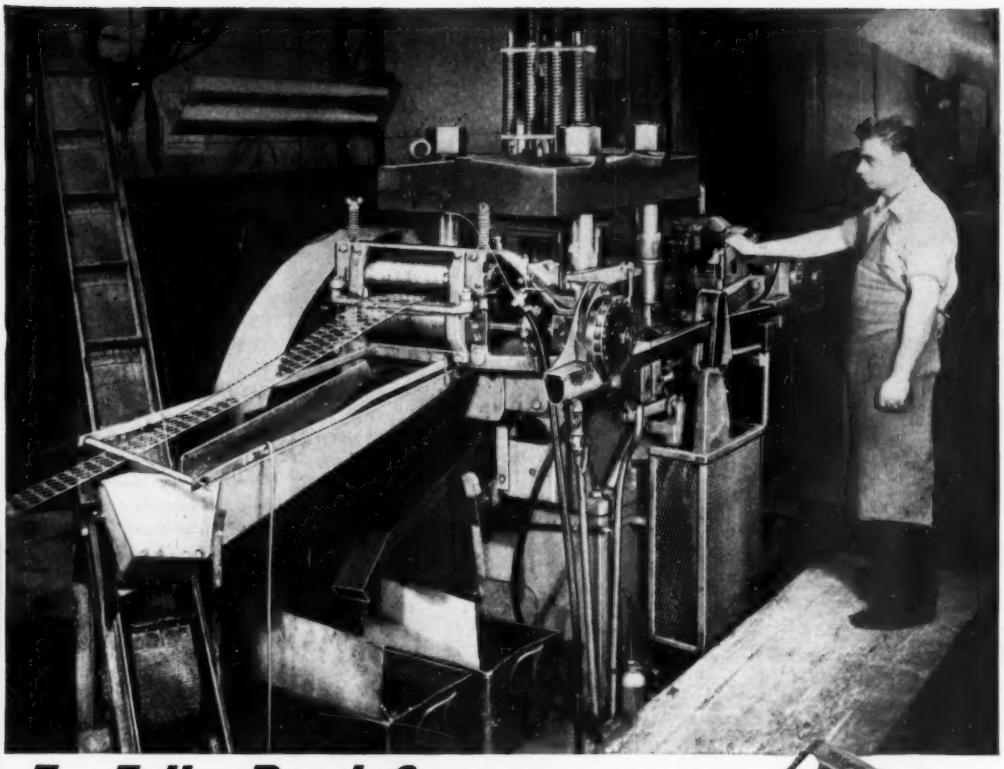
☐ Please have your Alemite Lubrication Representative arrange a desk-top demonstration of Oil-Mist. This entails no cost or obligation on my part.

☐ Please send me information about Oil-Mist by mail.

My name .....

Position .....

Company (leave blank if letterhead attached) .....

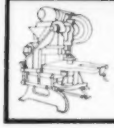


For Fuller Brush Company

Above illustration shows the 150-ton Henry & Wright Dieing Machine used by Fuller Brush Company to produce stampings, ring knobs, mop hinge clasps and other metal parts. Complete-per-stroke Henry & Wright progressive dieing machines set production records wherever they are installed. Yet get more stampings per hour, per square foot of space. Scrap losses are minimized. Henry & Wright machines not only produce at high speeds — their unique design increases die life by as much as 1200%.

Only the best is

PRODUCTS OF OUR ASSOCIATES INCLUDE:



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THE V & O PRESS CO.
Division of Hartford-Empire Company
HUDSON, NEW YORK

GLASS MAKING MACHINES

GLASS DIVISION
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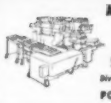

AUTOMATIC PACKAGING EQUIPMENT

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Division of Hartford-Empire Company
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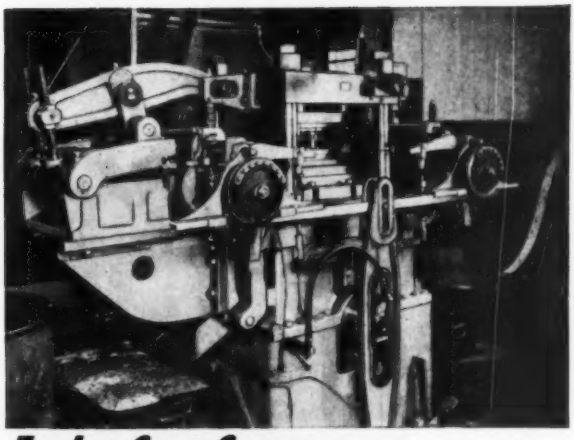
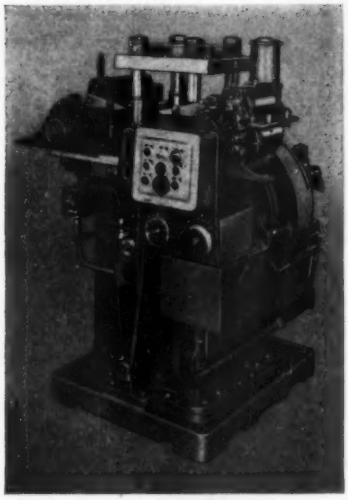
PLASTIC BOTTLES, RODS, TUBES, SPECIAL SHAPES

PLAX CORPORATION
Subsidiary of Hartford-Empire Company
HARTFORD 1, CONNECTICUT



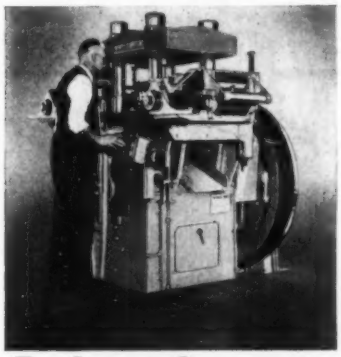
For Lux Clock Company

where Henry & Wright Dieing Machines get "practically every part we can put on a press." Lux keeps its seven H & W machines running "13 hours a day, seven days a week". Scrap loss is estimated at less than half of what it would be on other presses. Die life is doubled.



For Imperial Knife

Company, where four 25-ton Henry & Wright Dieing Machines do a fast, economical and efficient job of fabricating parts for pocket knives.



For Lionel Corporation

Installation, consisting of four 25-ton, seven 50-ton and one 75-ton Henry & Wright Dieing Machines, turns out transformer laminations and other parts.

good enough

FACT PACKED CATALOG
Complete descriptions of all Henry & Wright Dieing Machines. Write: Henry & Wright, 480 Windsor St., Hartford 5, Conn.

Henry and Wright

H&W

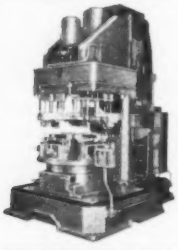
HENRY & WRIGHT
Division of Hartford-Empire Company

NATCO OFFERS

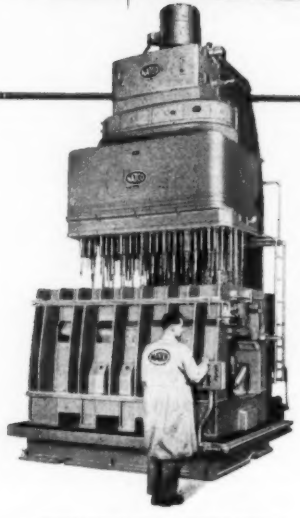
50 Years Experience

IN BUILDING A COMPLETE RANGE OF DRILLERS, BORERS, FACERS AND TAPPERS

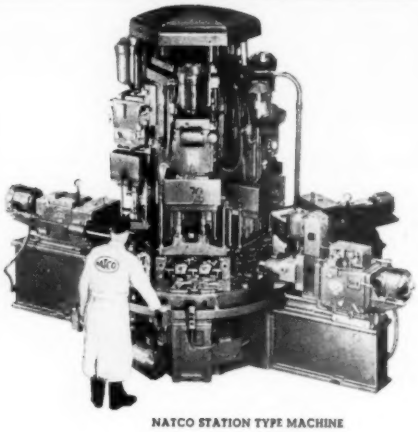
NATCO LIGHT SENSITIVE DRILLER AND TAPPER



NATCO HOLESTEEL ADJUSTABLE DRILLER AND TAPPER



NATCO HEAVY DUTY HOLESTEEL DRILLER



NATCO STATION TYPE MACHINE

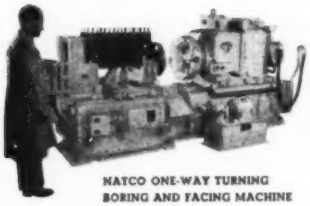
Out of the past fifty years of NATCO experience has come a deeper understanding of today's engineering and production problems. By reason of this maturity of understanding the NATCO organization is better equipped to help you solve your drilling, boring, tapping and facing problems. Better equipped with experienced engineers and designers. Better equipped with the most complete range of adjustable and fixed center multi-spindle machines in the world.

A few of the various NATCO machines are illustrated above. As you can see they range from small, fast, light-sensitive multi-drillers and tappers to large automatic processing machines . . . from single spindle to an unlimited number of spindles, from one direction to any number of directions, vertical, horizontal or angular, special or standard and operations range from 1/16" drill to 14" or larger bore. The materials worked include iron, steel, bronze, aluminum, wood and plastic.

NATIONAL AUTOMATIC TOOL COMPANY, INC. RICHMOND, INDIANA

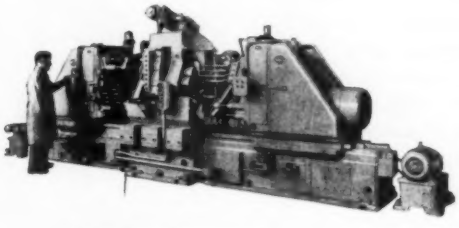
NATCO HIGH SPEED SENSITIVE DRILLER AND TAPPER

NATCO HIGH SPEED SENSITIVE UNIT

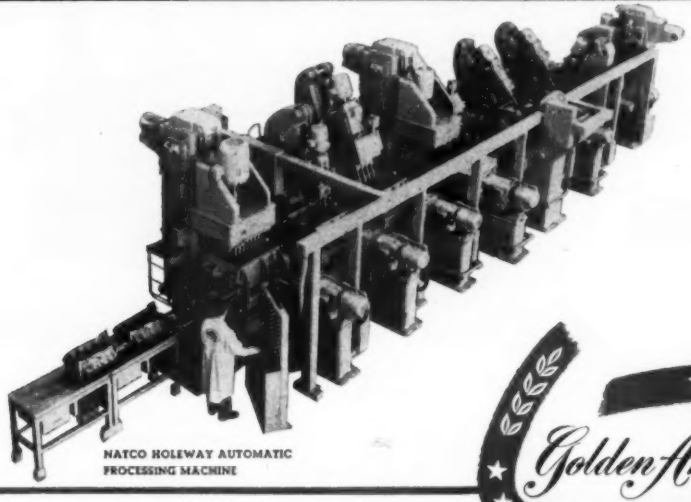


NATCO ONE-WAY TURNING BORING AND FACING MACHINE

NATCO THREE-WAY TAPPER WITH INDIVIDUAL LEAD SCREW



NATCO THREE-WAY TRUNNION TYPE DRILLING MACHINE



NATCO HOLEWAY AUTOMATIC PROCESSING MACHINE

Golden Anniversary

1901 NATCO 1951

Today NATCO offers you not only fifty years experience and ample production facilities but also several branch offices conveniently located to serve you in Detroit, Chicago, Buffalo and New York City.

To solve your problems in drilling, boring, facing and tapping most economically . . . Call a NATCO Field Engineer Today!

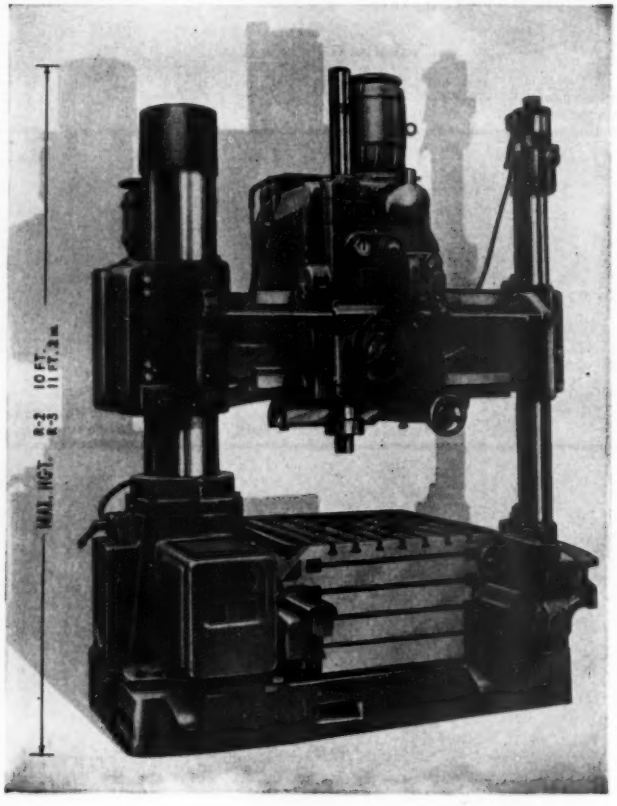
OERLIKON PRODUCTION JIG BORER

For Precision and Production Boring • Drilling • Reaming • Tapping Screw-Cutting • Facing • Outside Turning . . . . . without Jigs

The absolute ruggedness and rigidity of this machine, combined with the broad range of 18 spindle speeds and 12 feeds, permits locating holes—by the coordinate method using gauge blocks or pins—to a tolerance of .0004" to .0008" between centers. Holes as small as .040" can be drilled.

The smaller column rides easily over a wide arc. Finger-tip pressure will move it. Rigid locking of the Boring Head, Cross Rail and Smaller Column, in any position, is accomplished by electro magnets controlled by a single switch. . . . These units can also be mechanically locked or released independently of each other. . . . A specially designed Tool Ejector facilitates rapid tool changes.

SEE THESE MACHINES IN OPERATION AT COSA'S NEW YORK SHOW ROOM OR SEND FOR DESCRIPTIVE LITERATURE.



SPECIFICATIONS

	MODEL R-2	MODEL R-3
Drilling Capacity in Cast Iron	2-3/16" at .018" per rev.	2-3/4" at .030" per rev.
Drilling Capacity in Steel	1-3/4"	2-11/64"
Motor for Boring Head	6 hp.	7.5 hp.
Max. Distance between Spindle and Table	27-9/16"	39-3/8"
Max. Distance between Spindle and Base Plate	48"	59-5/8"
Horizontal Travel of Boring Head	25-19/32"	28-3/8"
Travel of Work Table	39-3/8"	47-1/4"
Clearance between columns	58-5/8"	65-3/4"
No. of Spindle Speeds	18	18
Spindle Speeds—R.P.M.	38 to 1900	30 to 1500
No. of Boring Feeds	12	12
Boring Feeds—In. per rev.	.0012" to .031"	.0012" to .0472"
Net Weight	13,350 lbs.	17,260 lbs.

COSA CORPORATION
405 Lexington Ave., New York 17

NATIONAL REPRESENTATIVES FOR: REISHAUER—Gear & Thread Chaser Grinders—Lead Screw Lathes • BECHLER—Swiss Automatics—Cam Shapers • DECKEL—Engravers and Copy Millers • MICAFIL—Coil Wipders • SALLAZ—Burnishing Machines • SCHUTZ—Forming and Cutting-Off Machines STUDER—Profile Grinders.

Your order is in for top performance... when you specify UNION *twist drills*

POPULAR TYPES of Union twist drills. (1) *General Purpose* — For top performance under a wide variety of drilling conditions. (2) *Slow Spiral* — Designed primarily for brass; also recommended for asbestos, bakelite, fibre, hard rubber and plastics. (3) *Fast Spiral* — For drilling deep holes in aluminum, copper, magnesium, marble, slate and other materials of low tensile strength. (4) *Heavy Duty* — For alloy steels, bolt drilling, cast iron, cotter pin drilling, rivets and stainless steels.

WITH EVERY TYPE OF MATERIAL, from softest wood to hardest alloy steel — and with every type of drilling equipment, from wood-boring braces to the most complicated machines — you can be sure of best results when you use UNION twist drills. Covering a range of drilling operations, these fast-and-free-cutting drills have maximum resistance to breakage, last longer and do more work between re-sharpenings. Make savings in time, trouble and money a part of your next order for twist drills . . . *Specify UNION!*

HANDY DRILL SETS

Union twist drills are available in a complete line of sets, together with metal index containers. Valuable time-savers, these index containers have individually drilled panel holes, with drill sizes, decimal equivalents and tap sizes plainly marked on panels. See your Union distributor for full details.

no other twist drill will outperform a UNION

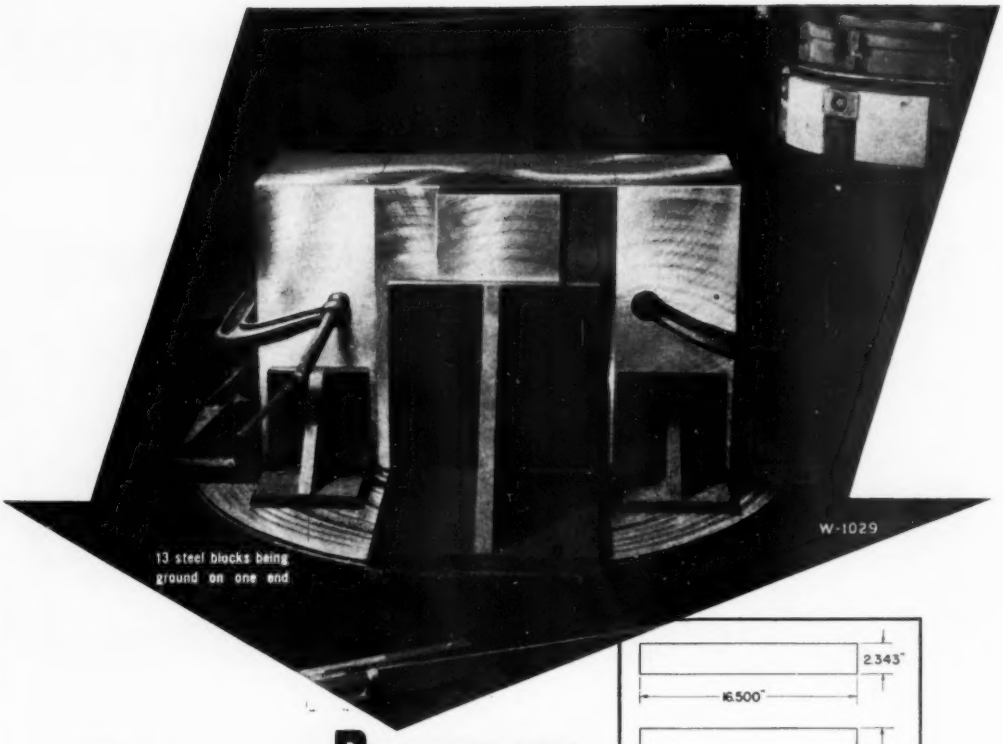
contact your local distributor

His name is listed in Union's THOMAS' REGISTER insert under "Drills, Twist."

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

Milling Cutters · Gear Cutters · Twist Drills · Hobs · Reamers · Carbide Tools

We own and operate S. W. CARD MANUFACTURING CO. Division, Mansfield, Mass. Taps, Dies, Screw Plates . . . BUTTERFIELD DIVISION, Derby Line, Vt., Taps, Dies, Screw Plates, Reamers . . . BUTTERFIELD DIVISION, Rock Island, Que., Milling Cutters, Twist Drills, Hobs, Reamers, Taps, Dies, Screw Plates.



Put it on the BLANCHARD

√. . . for stock removal

These annealed steel blocks were ground on all 6 surfaces on a Blanchard No. 18 Surface Grinder. Rough size was 16¾" x 7⅛" x 2½". *37.439 lbs. of metal were removed from each piece!*

√. . . for speed

Thirty of these steel blocks were ground on all 6 surfaces in 42½ hours. *This is a floor-to-floor time of only 85 minutes each.* All surfaces were ground square within .002", and flat and parallel.

√. . . for comparison

Let Blanchard grind some sample parts, or give you estimates from prints of your surface machining jobs. A comparison with your present methods may surprise you!

NO. 18 BLANCHARD SURFACE GRINDER

Send for your free copies of "Work Done on the Blanchard," fourth edition, and "Art of Blanchard Surface Grinding."

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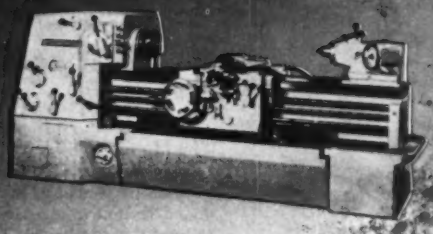
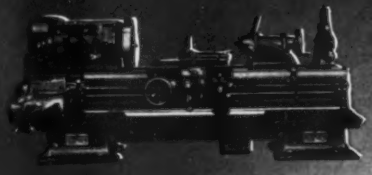
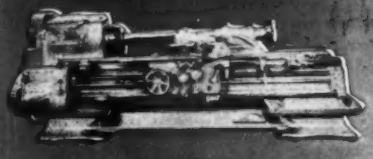
handle a wider range of work—

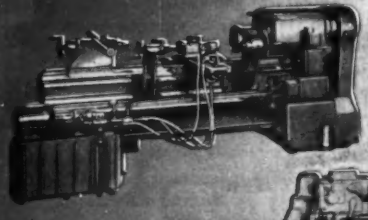
increase output—

lower operating costs









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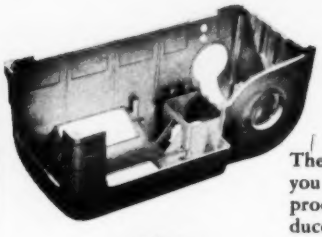
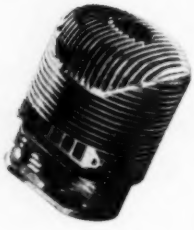
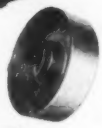
producing BIG ones? or small ones? using various types of alloys?

all your requirements for profitable die casting can be met with the

Model 400 CLEVELAND Die Casting Machine





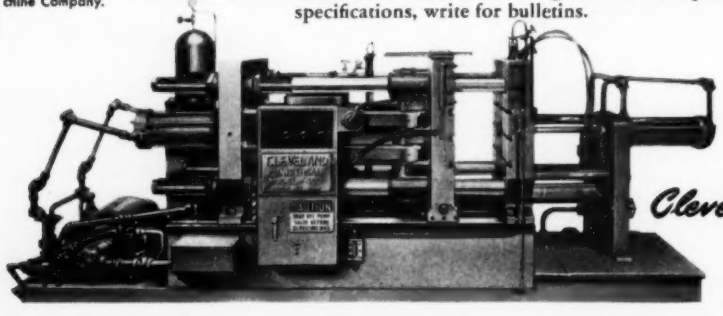


The Model 400 Cleveland Die Casting Machine will give you precision quality castings at a highly profitable rate of production. Castings may range in size from tiny parts produced in multiple cavity dies, to single castings weighing as much as 16.1 lbs. in zinc, or 7.5 lbs. in aluminum. *Universal* in design, the Model 400 can be quickly converted from zinc, tin or lead casting to aluminum, magnesium or brass casting, by changing the hot metal end.

Cleveland design gives you easy access to dies; ample die area; sure-fire shot mechanism; rapid, positive core pull and ejection; safe and simple control—either manual or automatic. Heavy, rigid construction and massive toggle linkage lock dies with tremendous pressure. Cleveland's high injection speed and pressure produce sound, dense, *hardware finish* castings. Dimensions are held to close tolerances; cored sections are precision-cast.

The nation's leading producers of die castings rely on Cleveland dependable performance—for around-the-clock production! You should find out now how Cleveland machines can improve *your* die casting production with money saved. Call in a Cleveland engineer. For complete machine specifications, write for bulletins.

Cleveland Model 400 High-Pressure Hydraulic Die Casting Machine. 36" x 38" die plates; 400 tons locking pressure. Die casting machines of smaller capacities are also produced by The Cleveland Automatic Machine Company.



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Clevelands Cut Costs

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
Cincinnati 12, Ohio

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CLEVELAND • DETROIT
HARTFORD • NEWARK

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

Wheelco ASSURES EXTREME ACCURACY WITH G.S. FRACTIONAL HORSEPOWER GEARS

A Stainless Steel Lead Screw, ground from the solid, to the most exacting specifications, controls the recorder pen in the dependable, highly efficient "Capacilog" . . Wheelco's newest Strip Chart Recorder. The extreme accuracy of this fine electronic instrument is largely due to the exceptional precision and uniformity of this Lead Screw together with G.S. Fractional Horsepower Gearing. G.S. Craftsmen are justly proud of their important contribution to the success of the Capacilog.

If *better* Gearing from 12 to 96 D.P. is a consideration in your business, discuss your needs with our competent engineers. More and more particular buyers from coast-to-coast are profiting by G.S. experience. You see . . we've specialized in the economical, mass-production of *high precision* Fractional Horsepower Gearing *exclusively* for more than 30 years!

SEND FOR FREE NEW

6-page folder which illustrates and describes G.S. facilities, Small Gearing and applications together with handy charts for those who specify Gearing from 12 to 96 D.P. and finer. Will you ask for it on company stationery, please?

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GEAR Specialties, Inc.

Spurs · Spirals · Helicals · Bevels · Internals · Worm Gearing · Racks · Thread Grinding

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WORLD'S LARGEST EXCLUSIVE MANUFACTURERS OF FRACTIONAL HORSEPOWER GEARS

WESTINGHOUSE
Life-Linestarter
PAIRED FOR PRODUCTION
Life-Line motor
WESTINGHOUSE
DO NOT LUBRICATE

Insure

machine performance with this matched pair

Motors and controls can make or break the performance of your machine tools. Why speculate? Life-Lines assure peak performance under all conditions. Take these, for example:

Accidental blows to starters? Will false operations result? Not with the Life-Linestarter®. Its inverted clapper-type design provides positive operation.

Contact life? Life-Linestarter contacts last longer, why? Because the exclusive "De-ion"® arc quickly divides, confines, and extinguishes the arc. Contacts, therefore never need filing.

Bearing lubrication? Life-Line motors prelubricated, sealed-for-life bearings eliminate this problem. These bearings need no lubrication. And because they are sealed, there's less chance for grit and dust to harm the bearings.

Physical abuse? Falling objects, excessive vibration, corrosive atmospheres—all take a heavy toll of weak motor frames. Thousands of installations have proved that Life-Line's steel frame stands up to physical and chemical abuse better than conventional frames. Steel adds strength without additional weight.

Consider the many other features of this motor and control production team—"paired for performance." Your Westinghouse representative has the facts. Ask him for copies of "Life-Line Motor Book" B-3842 and "Tomorrow's Starter Today" B-4677. Or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21638

YOU CAN BE SURE.. IF IT'S Westinghouse

Life-Line

MOTORS and CONTROLS

WESTINGHOUSE

NEW *Plus* IN PRATT & WHITNEY JIG BORER CONSTRUCTION

THIS new BALL ROLL SPINDLE QUILL — an exclusive feature on P&W Jig Borers — "roll-feeds" on (288) specially selected precision balls, *all preloaded*, under a total bearing pressure of 6000 lbs. Hardened, ground and draw-polished by hand to a fine micro-inch finish, it brings a lifetime of "tenth" precision to the toolroom. Operate it by hand and you'll easily feel a ⅛" drill feeding down into stock — it's that sensitive!

Seven years of painstaking tests prove this new P&W BALL ROLL SPINDLE QUILL MOUNTING maintains, without adjustment or service, all of the fine precision originally built into it.

PRATT & WHITNEY
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT

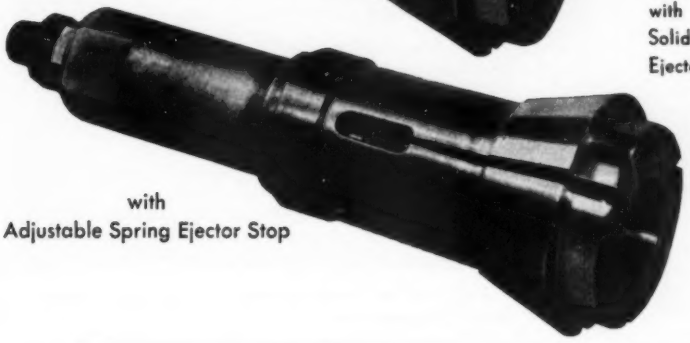
Now Standard on . . .

P&W Nos. 2A and 3B JIG BORERS and on the NEW No. 4E *Electrolimit* JIG BORER

HARDINGE
ELMIRA, N.Y.

Precision Stop Collets *Standardized for* Brown & Sharpe Machines

with
Adjustable Solid Stop



with
Adjustable Spring Ejector Stop

Now, you can do away with single purpose special collets and stops which are costly and cause production delays. Hardinge standardized Stop Collets and Stops for Brown & Sharpe Machines are interchangeable . . . one Stop Collet with a Solid Stop makes a complete Solid Stop Collet; and with a Spring Ejector Stop makes a complete Spring Ejector Stop Collet. Stop Collets and Stops are threaded for direct application — a sure way to reduce tooling costs and set up production.

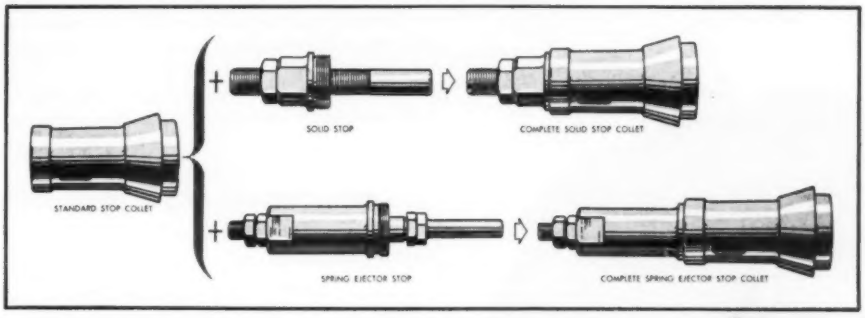


Diagram illustrates the interchangeability of the Solid Stop Assembly and Spring Ejector Stop Assembly with one Stop Collet to obtain either a complete Solid Stop Collet or a complete Spring Ejector Stop Collet.

Hardinge Stop Collets and Stops are engineered, customer-shop tested and approved for Brown & Sharpe Machines.

Write today for Bulletin SC which gives complete specifications, list prices, and ordering information.

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

Offices in principal cities. Export office 269 Lafayette St., New York 12, N. Y.

ARMSTRONG

Profit two ways with ARMSTRONG TOOL HOLDERS reduce cost—increase output

ARMSTRONG TOOL HOLDERS are *profitable* because they reduce overhead by saving while increasing output.

- Embodying the Armstrong Principle of an inserted cutter in a permanent drop forged shank or tool holder, they "Save: All Forging, 70% Grinding and 90% High Speed Steel."
- They save machine hours and man hours by permitting higher speeds and heavier feeds.
- They end costly delays for tooling up.
- They increase machining efficiency, for each has been carefully designed, is die perfect in form, is correct in cutting angle, in tool approach and clearance.
- They end tool breakage—have a wide safety factor of strength beyond need.

They reduce tool cost . . . each does the work of a complete set of forged tools and can be bought as needed from your local Industrial Distributor at prices so reasonable that no one can afford to make his own tools. Use the correct ARMSTRONG TOOL HOLDER for each operation on every lathe, planer, slotter, and shaper for increased production and profit.

Stocked by Leading Tool Departments

ARMSTRONG BROS. TOOL CO.

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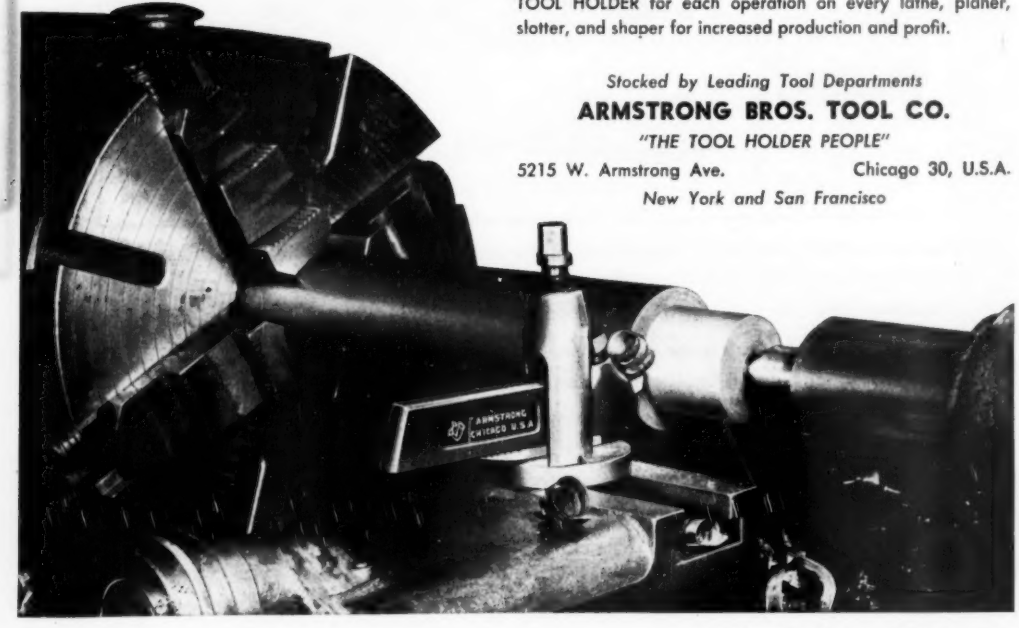
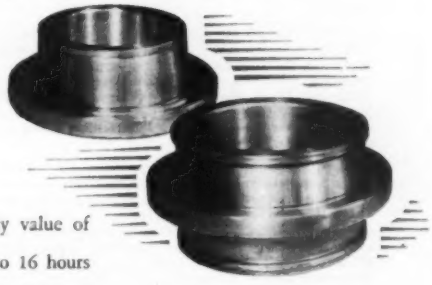


At the Tyson Bearing Company, Massillon, Ohio, one Bullard Man-Au-Trol Vertical Turret Lathe replaced four different type machines considered as the Best previous method.

The Tyson operator says, "It takes no time to get set, less than most other machines I've worked on. We can cut anything that we can hold on this machine. We have never found the limit of how much we can cut — if it's a rugged piece, she sure gets a good bite."

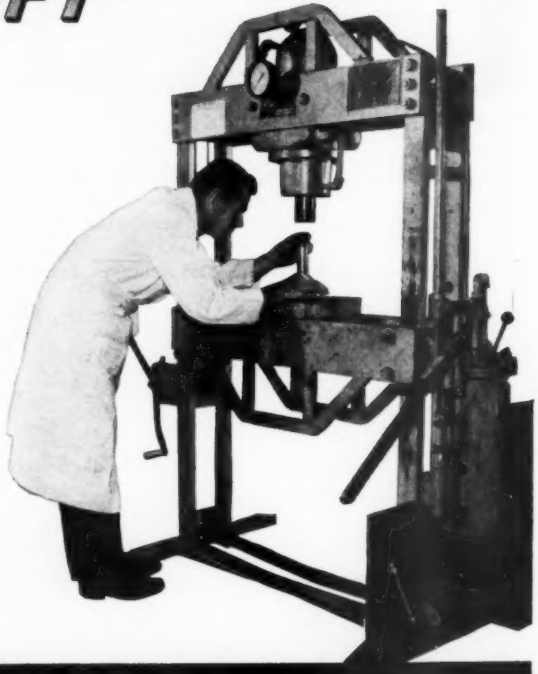


Another statement in this plant illustrates the utility value of Man-Au-Trol V.T.L. "Most of our work is short runs — from 2 to 16 hours for one part. Only occasionally do we run as much as five days on the same part. That's why we like the great Flexibility of Bullard Man-Au-Trol. With the former machines we set one for single purpose boring, another for the turning of cups. Man-Au-Trol does the whole job. I don't know of any machine that does as many operations with such simple tooling."

If this works for Tyson, perhaps it can be Profitable for you.
Ask a **BULLARD** *man to survey your jobs.*

THE BULLARD COMPANY
BRIDGEPORT 2, CONNECTICUT

KRW helps straighten out problems at DOUGLAS AIRCRAFT



Douglas Aircraft Co. is doing a fine job strengthening America's air arm. And this K. R. Wilson 75 ton Hydraulic Arbor press is a valuable piece of equipment at Douglas' Santa Monica plant. It's used for straightening threads, pulling gears, and for general trouble-shooting and machinery maintenance.

World War II saw the creation of many special wartime uses for KRW Hydraulic presses. Special air-oil operated ammunition loading presses were supplied to bomb loading contractors. Machine shops on Navy ships were equipped with KRW presses. And many a bent propeller shaft on those doughty little Navy PT boats was straightened on a KRW press.

Need hydraulic presses in your war work? KRW has a complete line ranging from 25-150 ton capacities. Hand-operated, air operated or motor driven; either vertical or horizontal ram travel. They're all fast, flexible, self-contained above ground and easily converted to war or peacetime operations. If you need a specially-built press, let us know. Our engineering department will design the press to your needs.

Ask your machinery dealer to quote you or write or wire Dept 11.

K·R·WILSON

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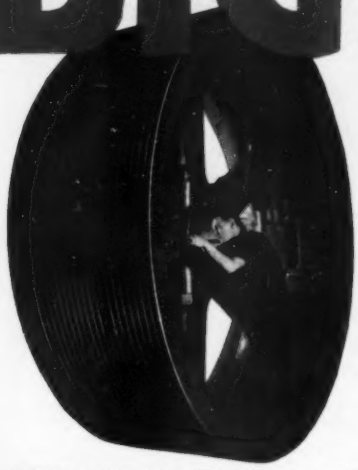
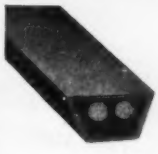
BIG or Small

...EVERYTHING IN V-BELT DRIVES!

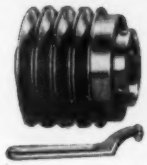


NON-STOCK SHEAVES — These sheaves are made to order from stock patterns for A, B, C, D, or E belts, 1 to 1000 hp. For further information check with your *Texrope* drive dealer or Allis-Chalmers Sales Office.

TEXROPE
Greatest Name in V-Belt Drives

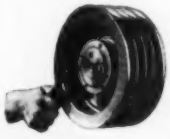


SUPER-7 V-BELT — Famous grommet construction. No splices where failure can start. Rubber cushion supports rayon cord at pitch line. Sizes and sections to suit all operating conditions. All Standard sizes from stock.



***VARI-PITCH* STANDARD SHEAVE** — Speed range of 9% to 28% on drives of 1 to 300 horsepower, using A, B, C, D, or E belts. Two to 10 grooves. These sheaves are available in either motion control or stationary control.

AUTOMATIC *VARI-PITCH* SHEAVES — Offer stepless speed control . . . one to 40 hp . . . 2 to 1 speed range. Move motor forward to increase speed, and back to decrease. One hand does it while motor is running.



MAGIC-GRIP SHEAVES— Fastest mounting sheave you can buy. Aligns easily . . . cannot shake loose. 1 to 12 grooves for A-B, B, C, and D belts. 1 to 250 hp. Stocked in many cities for immediate delivery.

***TEXSTEEL* SHEAVES** — Pressed steel sheaves for applications from ¼ to 25 horsepower. Light weight and rigid. 1 to 6 grooves, A or B belts. All sizes and bores are available for delivery from stock.

***VARI-PITCH* SPEED CHANGER**—Smooth, accurate speed control at turn of hand wheel. Machines operate at exactly the speed for best production. Stepless speed range: 3¾ to 1. Capacity: 1½ to 75 hp.

YOU CAN GET every V-belt drive component from the *Texrope* line: Constant speed drives; standard and wide range *Vari-Pitch* drives; speed changers; motor bases; and new or replacement long lasting *Super-7* V-belts.

Get Added Benefits

In addition, you get extra engineering skill both in the field and factory that comes from having more industrial V-belt installations than any other manufacturer.

The world's greatest store of V-belt engineering knowledge has been condensed into a 120 page *Texrope* Pre-Engineered Drive Book. Covers 90% of all V-belt drive requirements. Ask your Allis-Chalmers Authorized Dealer or Sales Office for Bulletin 6956A, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3272

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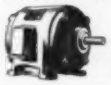


MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

MARKS THE SPOT
RELATIVE WORKABILITY of Carpenter STAINLESS STEELS
STANDARD ANALYSIS TABLE
OPERATION
THE CARPENTER STEEL COMPANY • READING, PA.

Where *Carpenter* Helps You in Your Work with Stainless

Getting better machined finishes, longer tool life and fewer rejects on Stainless jobs is the answer to—

- **increased production from every shift**
- **more parts from every pound of material**

To make Stainless Steel do its best for you, take advantage of the help Carpenter can provide. We'll be glad to give you personal help in the shop and useful printed information that makes it easier to work with Stainless.

The new Carpenter Stainless Slide Chart quickly gives you information your men need to know. It gives the relative workability for many grades, useful information for jobs where you do *blanking, deep drawing, forging, heading, machining, welding*, etc. You will also find a complete table of information on the physicals for the Stainless grades. Just drop us a note, on your company letterhead indicating your title, and we will put your Carpenter Stainless Slide Chart in the mail for you.

The Carpenter Steel Company, 109 W. Bern St., Reading, Pa.
Export Department: Reading, Pa.—"CARSTEELCO"

Carpenter
STAINLESS STEEL
takes the problems out of production

For Easy-to-Use Stainless Call Carpenter! Warehouses in principal cities throughout the country.

FOR BEST RESULTS IN ANY TAPPING JOB DEPEND ON BUTTERFIELD, THE LINE THAT'S

100% INSPECTED... 100% COMPLETE!

Spiral Pointed. High speed or carbon steel. For tapping deep through holes or holes deep enough to allow bottom chip clearance.

Spiral Fluted. High speed steel. Correct spiral for free cutting while ejecting chips from hole.

FOR EXAMPLE...

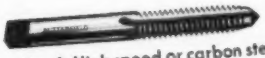
Hand Taps

Standard. High speed or carbon steel.

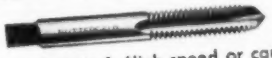
Three-Fluted. High speed or carbon steel.

Stub Fluted. High speed steel. For threading holes in thin sections.

Machine Screw Taps



Standard. High speed or carbon steel.



Spiral Pointed. High speed or carbon steel. For tapping deep through holes or holes deep enough to allow bottom chip clearance.

Stub Fluted. High speed steel. For threading holes in thin sections.

Pipe Taps

Taper or Straight. High speed or carbon steel.

Interrupted Thread. High speed steel.

Inserted Chaser. High speed steel.

And MANY OTHERS, INCLUDING...

STOVE BOLT TAPS • PULLEY TAPS • STAYBOLT TAPS
BOILER TAPS • NUT TAPS • SERIAL TAPS
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Remember: There's a Butterfield Tap for top performance in every material.

SEE YOUR NEARBY BUTTERFIELD DISTRIBUTOR FOR PROMPT DELIVERIES AND SERVICE

Union Twist Drill Company
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Derby Line, Vermont • *In Canada:* Rock Island, Quebec

Bar stock being tested for microstructure . . . one step in Butterfield's 100% inspection.

BUTTERFIELD

THE 100% INSPECTED TOOLS

Every Tool Individually Inspected

TAPS • DIES • REAMERS • SCREW PLATES

"We've reduced machining costs plenty since we switched to ANTISEP BASE*!"

PRODUCTION DATA

PART: Collet

OPERATIONS: Forming, deep drilling, chamfer, boring and cut-off

MACHINE: 3" Conamatic

METAL: Hy-Ten Steel - "M" temper

(Surface speed is 85 feet per minute, .005 feed)

Reports Midwest Collet Manufacturer

● This company was dissatisfied with the cutting oil they had been using. Results didn't justify exceptionally high costs. When they changed to Antisep Base—mixed 1 to 25 parts water—they got the good performance they were after, with an annual saving of $350. per machine!

You can use Antisep All-Purpose Base with full confidence. Dilute it with water, even for difficult machining previously done with straight cutting oils. Antisep provides great cooling ability, safety, finish and speed, enabling automatics, as well as other machines, to turn out better work much more economically.

Antisep is high in anti-welding properties and film strength. It is antiseptically treated to eliminate rancidity and deter bacteria growth.

Ask the Houghton Man to show you how Antisep A. P. Base can be used "across the board"—both as a coolant and as a die lubricant for many stamping operations. Write or call E. F. Houghton & Co., Philadelphia 33, Pa.

* HOUGHTON

ANTISEP

ALL-PURPOSE CUTTING BASE

handles 90% of your machining operations—*even automatics!*

GET LATEST BULLETIN

containing actual performance proof of Antisep's cost-reducing features.

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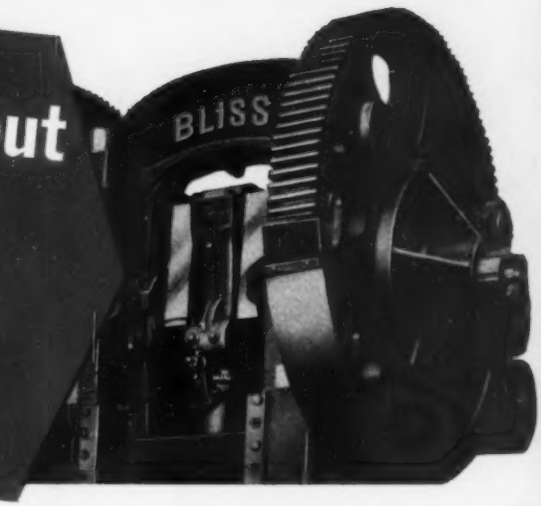
Ready to give you on-the-job service . . .

Increase output 60-70% with Quick-Return Drive...



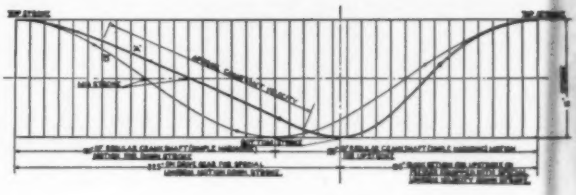
on BLISS Long Stroke Presses

For cartridge case press lines, the extremely long strokes of redraw presses either slow production or give excessive draw speeds. With the quick return drive built into Bliss long-stroke crank presses, output of entire lines can be increased 60% to 70% with a reduced and more efficient draw speed.

The Bliss "drag-link" mechanism gives uniform velocity on the downstroke and quick return on the upstroke. By providing better drawing conditions it makes possible the production of more perfect stampings.

In the field of shell drawing, for example, shells with flanges, or shells that are tapered or stepped to different diameters at different portions, may be drawn or redrawn with absolute uniformity of every dimension—a result of the uniform down-motion of the stroke.

For drawing or forming steel, copper and brass...for light and powdered metals, Bliss has the presses—hydraulic or mechanical—which will increase your production. Write Bliss engineers for further information.



Displacement curves show difference in motions and velocities of two slides actuated by the two different crank mechanisms while operating at same s.p.m. and over the same length of stroke. Curve A is the motion imparted by the new constant-velocity mechanism. For the greater part of the downstroke, above as well as below midstroke, speed of the slide is very nearly constant, and the velocity at midstroke is less than 60% of the normal crank velocity for the same s.p.m. Quick return on the upstroke brings the slide to top position at the end of the same time-interval as that in which the regular crank mechanism makes one complete cycle with simple harmonic motion.

E. W. BLISS COMPANY, CANTON, OHIO

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

700-Page Handbook Tells How to Use Presses Efficiently

Bliss Power Press Handbook, 450 illustrations. Sections on: Easy methods of computing press jobs • How to select proper press • Engineering tables • Die illustrations • Glossary of terms. Plus service section on all Bliss presses.

Price $7.50

E. W. Bliss Company—Handbook Dept., Canton, O.

From the right press for a given job... to a complete press room...

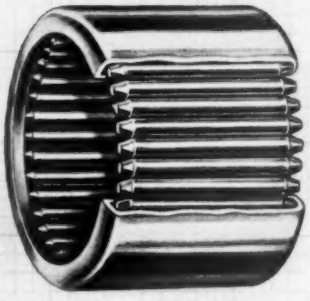
It's Bliss

...needs little care

Torrington Needle Bearings require a minimum of maintenance ... operate smoothly and efficiently for long periods without attention.

Lubricant is effectively retained by the turned-in lips of the outer shell, which also help to seal out dust, moisture and other foreign matter. An even film of grease or oil is spread over all bearing contact surfaces by the full complement of small diameter rollers.

In many cases, Needle Bearings can be lubricated for life at installation. Our engineers will be glad to help reduce your maintenance problems with Torrington Needle Bearings.



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TORRINGTON *NEEDLE* BEARINGS

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Production Pointers from GISHOLT

GISHOLT
COST CUTTING IDEAS

Gisholt—A Unique Service in the Machine Tool Industry. Here you obtain unbiased help on your turning problems, because Gisholt's broader range of equipment includes both manually operated turret lathes and automatic lathes. Gisholt's recommendations are made without prejudice for one type of machine over another.

FASTERMATIC EASES MANPOWER PINCH—MACHINES ELECTRIC MOTOR PARTS AUTOMATICALLY

Multiple Cuts on 6 Surfaces Finish 14″ Motor End Bells in 7.5 Minutes

This manufacturer is answering the call for more production . . . with fewer man-hours. And the Fastermatic Automatic Turret Lathe figures prominently in the picture.

The job is machining cast iron end bells for electric motors. Multiple cuts are made on six surfaces to rough and finish the parts complete, ready for assembly. Only 7.5 minutes, floor-to-floor, go into the entire machining operation.

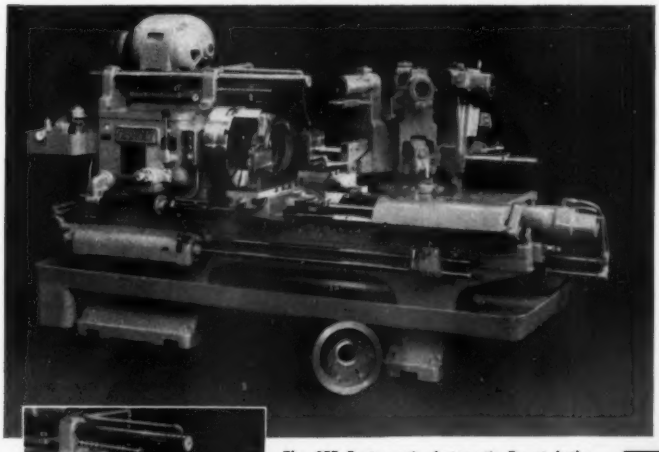
The 14″ end bells are held on the O.D. with swivel jaws in a 3-jaw air chuck. Turning the rabbet fit diameter and all internal surfaces, including rough and finish straddle facing, are handled by tools on the hexagon turret. Tools on the independent front and rear slides face the large flange. This completes all machining for a final fit on the stator.

Operator Only Loads, Unloads

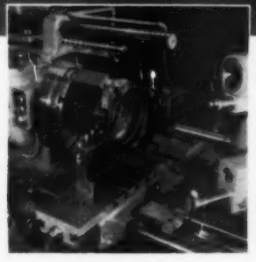
Not once during the entire machining operation does the operator have to touch the machine. His only job is to load and press a button—and 7.5 minutes later remove the completed part. This frees him to operate other machines—for more production, greater output per man and lower costs.

Adaptable to Wide Range of Jobs

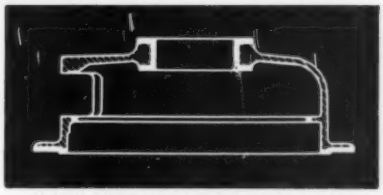
This job, and most jobs that call for a maximum number of surfaces to be machined in a single chucking, is a natural for the Gisholt Fastermatic Automatic Turret Lathe. The six turret faces and two independent cross-slides give you a degree of flexibility that's unmatched by any other type of standard machine of comparable size.



The 2FE Fastermatic Automatic Turret Lathe.



Close-up shows new independent front and rear slides of Fastermatic. New T mountings provide faster tool change-overs and wider range of adjustment.



Multiple cuts are made on the heavy line surfaces.

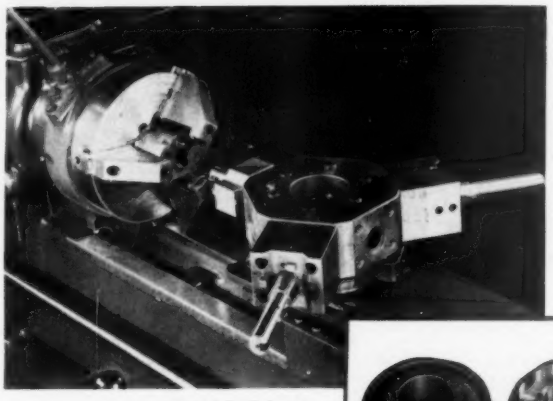
BACK-FACING OPERATION ON CLUTCH SLEEVES JOB GETS "FREE RIDE"

Proper Planning Eliminates Extra Operation

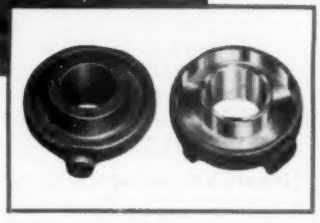
Maybe you can use this smart idea. The job is machining malleable iron clutch release sleeves. Without careful planning, back-facing of the hub could have meant a 2-operation setup.

The job is run on a Gisholt No. 4 Ram Type Turret Lathe. The turret tooling for counterboring, facing, chamfering, recessing, etc., is pretty much conventional for high production output. The smart trick is the way they face and chamfer the back of the hub.

A back-facing fixture is mounted *inside* the spindle. This is operated from an inclined cam on the boring bar. As the turret feeds forward for conventional turning, boring and facing, this cam moves a slide tool to back-face and back-chamfer. These back surfaces require no additional time—thus the "free ride." Floor-to-floor time is 3 minutes.



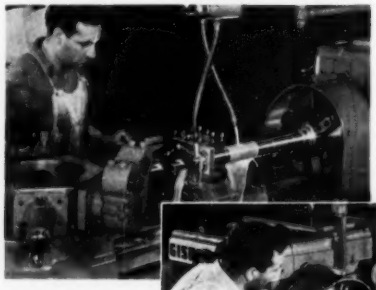
Gisholt No. 4 Ram Type Lathe with special back-facing attachment for machining clutch release sleeves (inset).



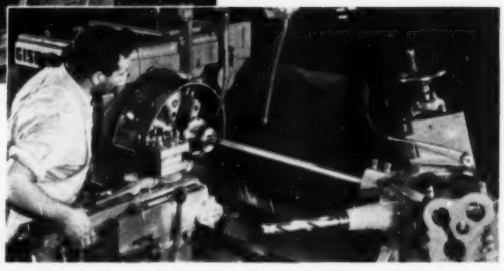
Without this attachment, the work would have to be rehandled. Or, if done in the same chucking, it would be necessary to reach in through the front with a long overhanging hook tool, and therefore suffer from its lack of rigidity and accuracy. Either way, you couldn't equal the swift floor-to-floor time of the back-facing attachment mounted inside the spindle.

Incidentally, the workpiece is held in a Gisholt-Barker Wrenchless Chuck. This permits fast action and leaves the spindle free to hold the back-facing fixture.

IL TURRET LATHE A MASTER AT DEEP-HOLE DRILLING



First chucking—boring with a twist drill.



Second chucking—finishing the bore with a gun drill.

Combines Speed with Accuracy

A sturdy machine is a "must" for deep-hole drilling. The Gisholt IL Saddle Type Turret Lathe is a heavy machine—built for rigidity and accuracy.

Here's one of these turret lathes doing this work at the Rockford Machine Tool Company. The part is a 4615 forged spindle for the "16" Rockford Economy Lathe.

The job is drilling a $1\frac{9}{16}$" hole a distance of $25\frac{7}{8}$" with a tolerance of plus or minus .010". Two chuckings are necessary. First the part is drilled for a depth of 9" with a $1\frac{1}{2}$" twist drill. The photos show how the workpiece is supported by a steadyrest mounted in the square turret on the side carriage. For the second chucking the piece is reversed and the remaining 17" is removed with the same drill. Then, a $1\frac{9}{16}$" gun drill is run the entire length of the bore.

WORTH OUT OF MAN-HOURS

GISHOLT

COST CUTTING IDEAS

SIMPLIMATIC WITH 24 FAST CUTTING TOOLS TURNS OUT TRACK ROLLERS IN 2½ MINUTES

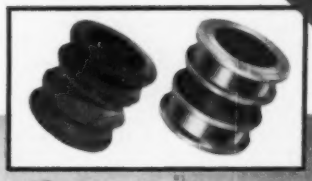
Steel Forging Trimmed of 15 lbs. in Quick, 1-Chucking Job

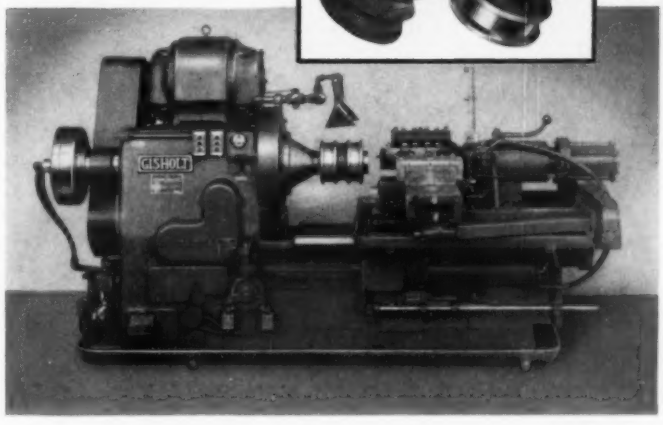
Track rollers are in the news . . . and this Simplimatic job is a real headliner on this type of work.

Twenty-four carbide-tipped tools convert the hefty steel forgings into finished track rollers in only 2½ minutes machining time. For this man-sized cutting, the Simplimatic is called upon for 40 horsepower at the peak of cutting load. The 24 tools are mounted on front and rear slides, and perform all turning, shaving, facing and chamfering operations in one chucking.

This Gisholt Automatic Lathe handles two different sizes and types of track rollers. It is equipped with a 16″ air cylinder with push rod for equalizing chuck pressure on expanding chuck fingers.

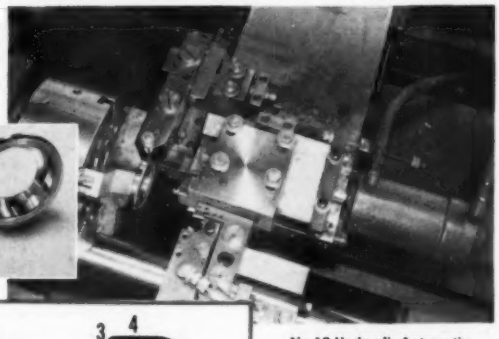
(Below) Simplimatic set-up to machine 2 sizes and types of track rollers. (Right) Before and after machining views of forged steel track rollers.

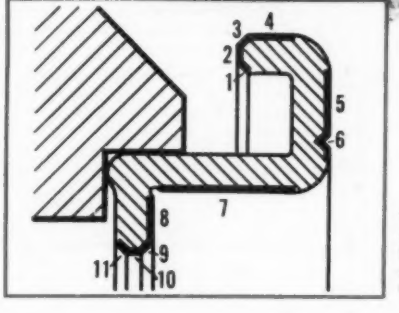




11 SURFACES EACH PART . . . 100 PARTS PER HOUR. THAT'S PRODUCTION!

Finished coupling covers. The smallest is machined at .5 minute floor-to-floor; the largest 11″ size in 2.0 minutes.





No. 12 Hydraulic Automatic Lathe tooled for machining various size coupling covers.

The heavy lines show the 11 surfaces machined in a half-minute, floor-to-floor.

No. 12 Hydraulic Shows Its Stuff on 3¾″ Coupling Housings

Here's a case where production of small coupling housings booms along at 100 per hour. *And,* there are 11 surfaces machined in the brief half-minute floor-to-floor time!

In order to finish all these surfaces, a special auxiliary slide, activated by the rear slide, handles the back facing and chamfering. The same basic tooling handles the full range of sizes from 3¼″ to 11″.

Free "Equipment Replacement Analysis" Forms!

Take the "hit and miss" out of your machine tool replacement program. Know which machines you can replace most profitably. Gisholt has made up "Equipment Replacement Analysis" forms (as determined by MAPI formula) into clear, easy-to-use 4-page folders. Write for your copies today.

UNDER-PAR EFFICIENCY...*REPLACE NOW!*

GISHOLT

GISHOLT

COST CUTTING IDEAS

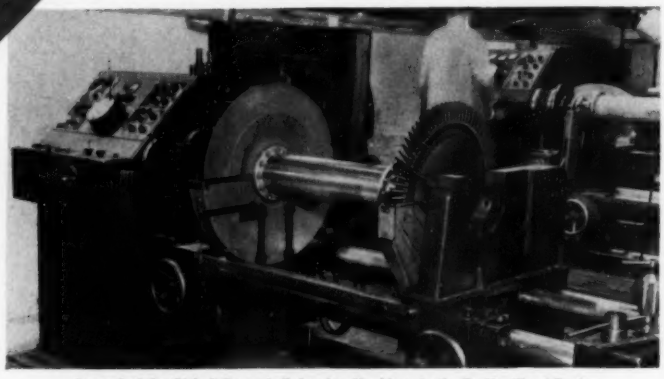
TAKING THE FRETS OUT OF THE JETS

Precision Balancing Makes Faster, Safer Jet Planes Possible

Today's faster-than-sound jets owe much of their terrific speed to precision balancing. Accurate balance is especially vital in the ultra-fast rotating heart of the jet engine—the turbine compressor assembly.

That's why in England, too, Gisholt Dynetric Balancing Machines have the major role of measuring and locating dangerous unbalance in such parts. This Type 3U machine serves in the De Havilland Engine Works, balancing turbine-compressor assemblies. For security reasons, details cannot be revealed, but it is known that without the extreme smoothness of operation made possible by precision balancing, neither this jet engine nor any other could operate at such tremendous speeds.

Precision balancing can make your rotating parts and products better performing, longer lasting. The story of balancing is given in the 36-page booklet, "Gisholt Balancing Machines." Ask for your copy.



Several of the Gisholt Dynetric Balancing Machines in the De Havilland Engine Works. These balance a variety of vital jet engine parts.

DYNETRIC BALANCERS GISHOLT

DRIVE SHAFTS SUPERFINISHED—350 TO 400 PER HOUR

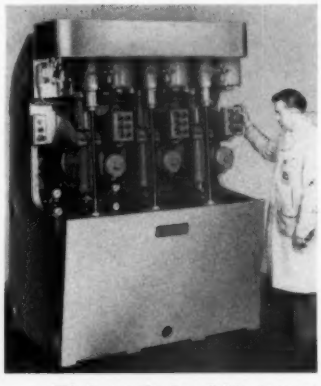
Proves Small Cost of This Important Refinement for Longer Wearing Surfaces

If you think Superfinishing is a luxury, see what it's doing in the cost-conscious automotive industry.

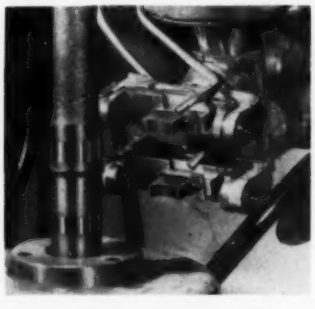
This manufacturer had the usual oil seal problems—until Superfinish solved them. Now, three Model 74 Superfinishers handle all 7 types of rear axle drive shafts.

Each Superfinisher has three stations with individual controls and an automatic cycle. One man keeps all three stations operating simultaneously. All surfaces come to the Superfinishers ground concentrically to an average of 35 micro inches RMS. They leave the machines measuring 8 to 10 micro inches RMS, ready for use. Each of the 3 stations completes a drive shaft in 25 seconds, floor-to-floor time.

Superfinish makes these oil seal surfaces wear longer and stay oil-tight longer. Why not get acquainted with this highly effective, low-cost production step? Write for your copy of "Wear and Surface Finish." No charge, of course.



This three-station Superfinisher turns out 350 to 400 Superfinished axles per hour.



Close-up of rear axle shaft with two oil seal surfaces. Superfinishing stones are in retracted position. Three stations like this are on each machine.

No. 451
568

GISHOLT

The Gisholt Round Table represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

A general catalog on machines listed below is available on request.

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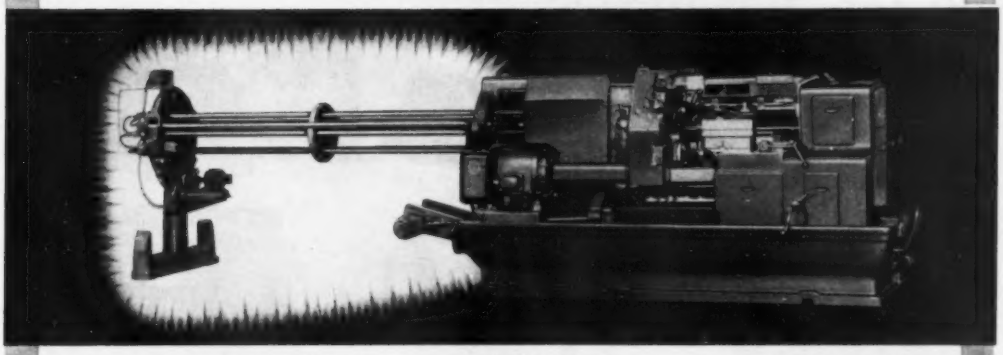
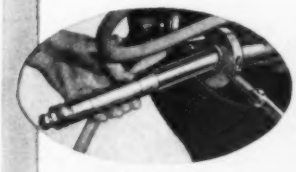


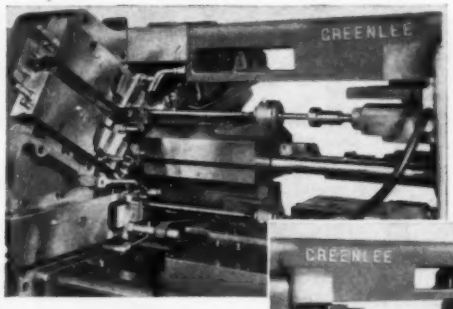
with GREENLEE AIR-FEED AUTOMATICS

Stock scoring — a necessary evil with conventional feed fingers — has often prevented certain jobs and materials from being handled on automatics, and has resulted in higher production costs. Now stock scoring can be completely eliminated by using Greenlee 1-inch 6-Spindle AIR-FEED Automatics which do away with the usual mechanical stock pusher arrangement. Instead of being gripped, the stock is moved forward smoothly and rapidly by an air-propelled piston in each stock reel tube.

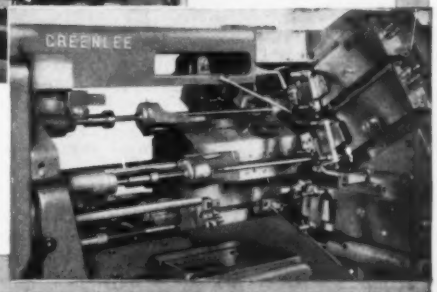
There are other advantages, too. Quicker set-ups are possible by the elimination of stock pusher changes for different size stock. Multiple feed-out arrangements can be easily adapted, requiring only the setting of stock stops and collet openers at the desired feed-out positions. With only the air behind it, the stock will feed out in *any* of five positions to wherever the stop is set. On simple cut-off and form jobs, this permits production of 2 or 3 pieces per cycle. Investigate Greenlee AIR-FEED for *your* shop.



Showing the piston inserted in the stock reel tube, to push the stock by air pressure. A suction pump returns the piston for reloading the tube.



Left, stations 1, 2, and 3 of a machine set up for multiple feed-out. The piece in this case is 16-3/32" long and requires only forming to a smaller diameter at one end. Live bushings ahead of the stops are used to prevent whipping.



Right, rear view of the same machine as above, showing positions 4, 5, and 6. The stock feeds out at positions 1, 3, and 5 and is formed. Cut-offs are at positions 2, 4, and 6 and chutes (not shown) are rigged to slide finished pieces away from the working area.

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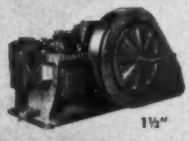
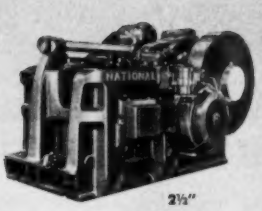

1½"

2"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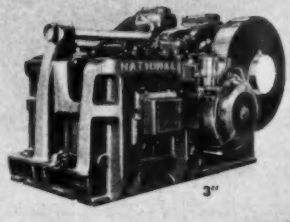
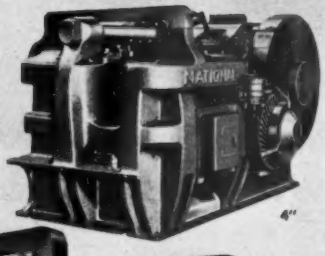

3"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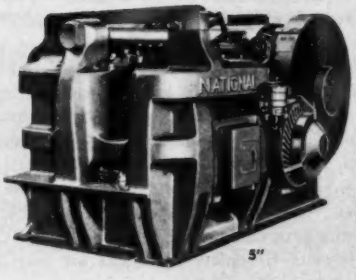
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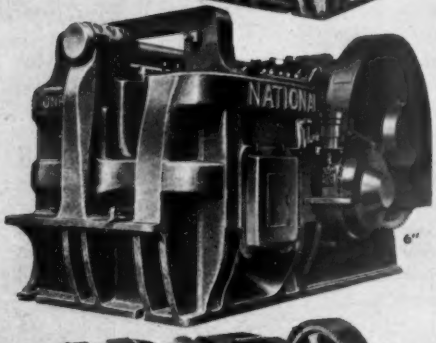
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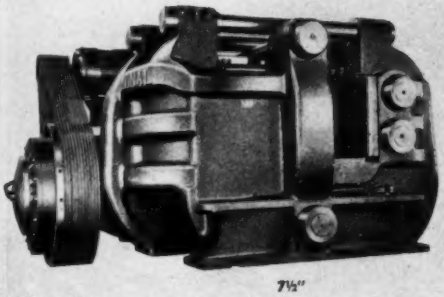
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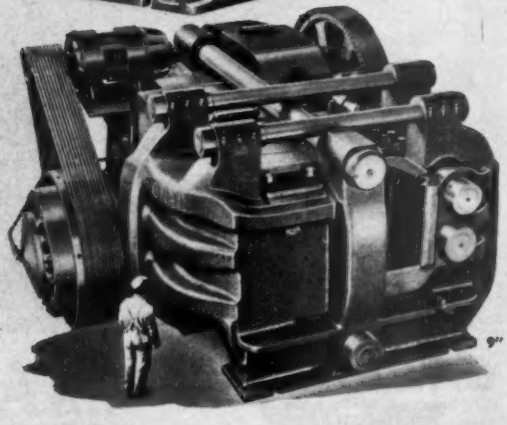
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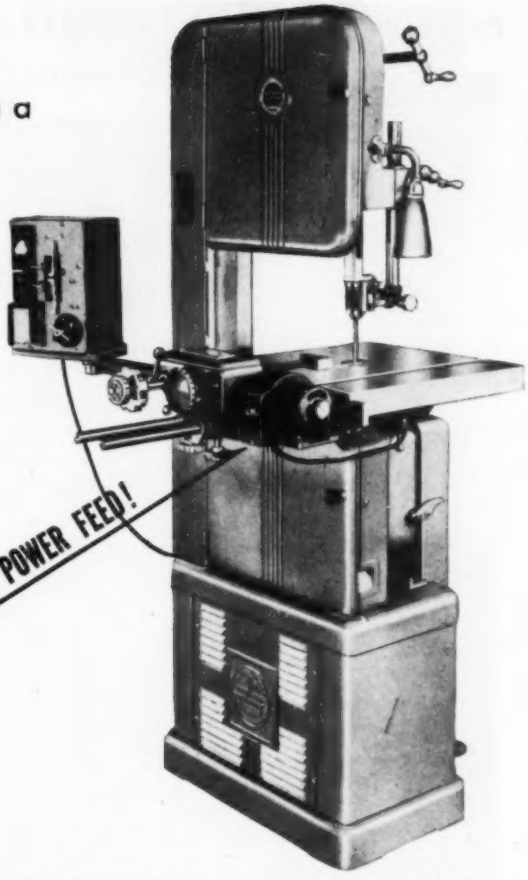

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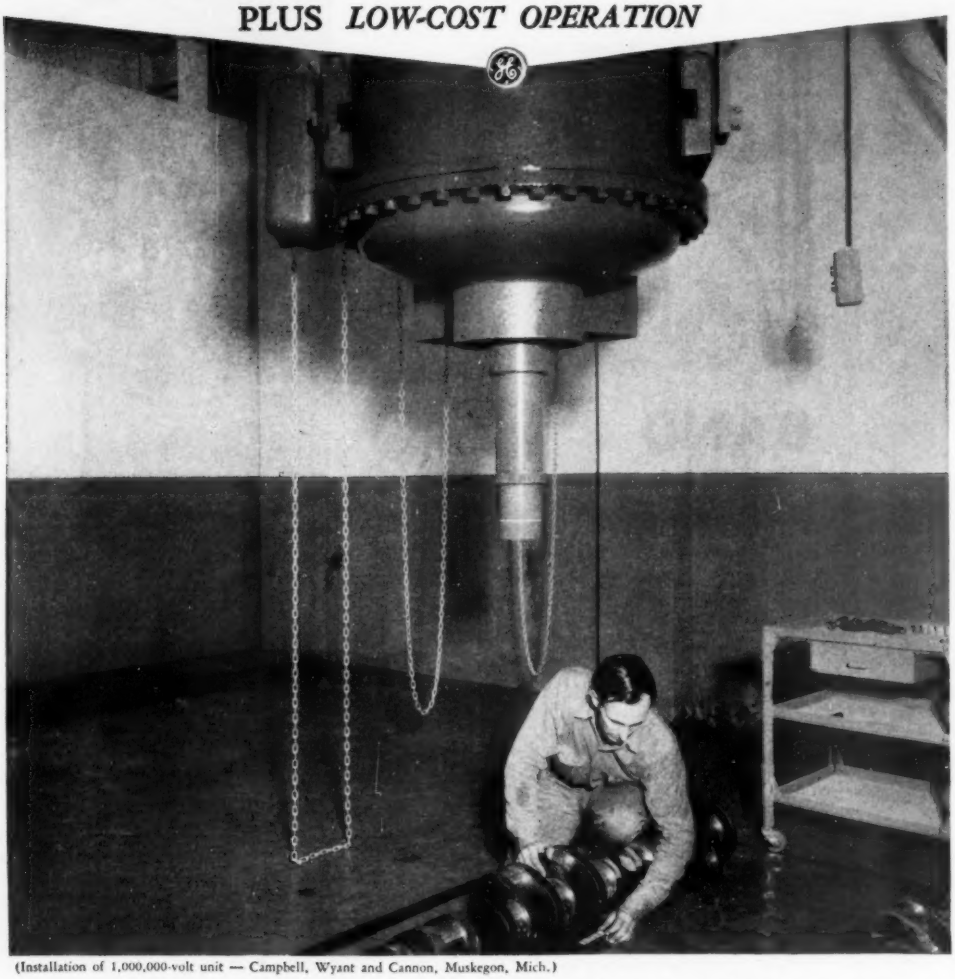

(Installation of 1,000,000-volt unit — Campbell, Wyant and Cannon, Muskegon, Mich.)

General Electric Industrial X-Ray is a production tool that often pays for itself on the first job!

Scores of companies rely on radiography for that extra measure of assurance that comes from knowing — not guesswork. The high-voltage industrial x-ray unit illustrated above is noted for its low-cost operation and absolute dependability. Developed to high efficiency to satisfy the hectic production demands of World War II, it ideally meets today's foundry needs — both in the laboratory and on the production line.

Here's the experience of a Michigan automobile manufacturer: "An outstanding example of the contribution of radiography to the improvement of production processes resulted when examination of one type of crankshaft showed lack of fusion at the chill and pointed the way to improved techniques resulting in a savings conservatively estimated by the company to be $250,000 on a year's production." Write for booklet: "Radiography as a Foundry Tool." General Electric X-Ray Corporation, Dept. AB-4, Milwaukee 14, Wisconsin.

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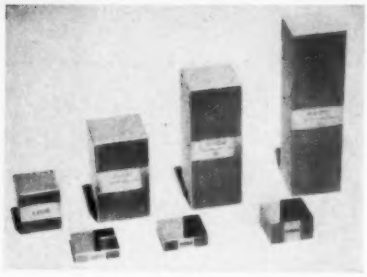

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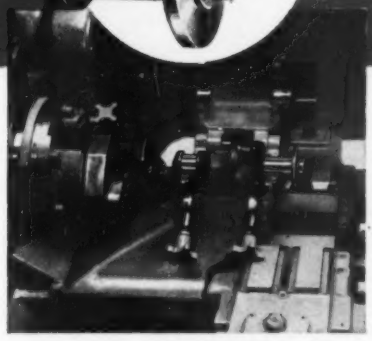

P&J-designed hinged clamping fixture, set up on the P&J 3U AUTOMATIC (extended bed model), sturdily supports the full 19" of length of Crankshafts for fast precision machining.

Skillful P&J-designed Carbide Tooling on the speedy P&J 3U AUTOMATIC completes six separate precision-machining operations in record time on the flanged end of this carbon steel (230 Brinell) Crankshaft. The set-up is typical of P&J tool engineering for the 3U's high-speed, high-precision performance. It invariably points the way to production gains of substantial importance.

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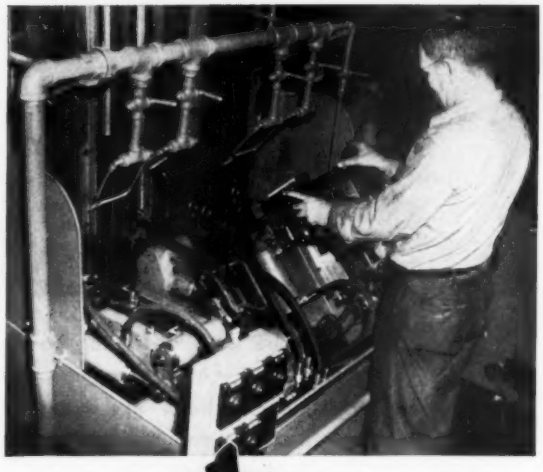

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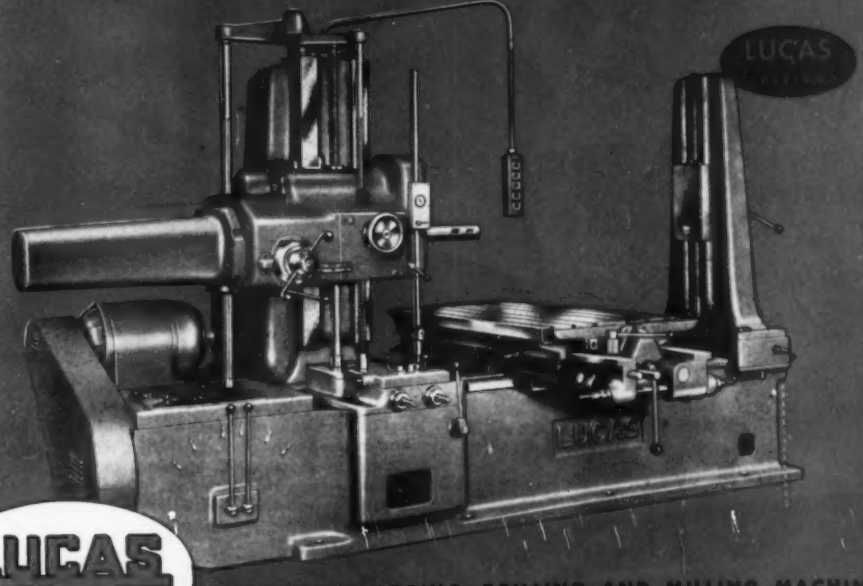
For half a century we have concentrated on one thing . . . improving Lucas horizontal boring machines.

Through all these years the thousands of Lucas "Precision" horizontal boring machines in use throughout the metal-working industries have demonstrated their outstanding leadership as the Standard of Comparison for both extreme accuracy and top performance.

The recent improvements incorporated in the advanced design of today's Lucas machines is a guarantee that this leadership will be maintained.



LUCAS Precision

HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 9, OHIO

CARMET

can solve *YOUR* *Wear-Resistance* problem

● WHAT JOBS HAVE YOU FOR CARMET CARBIDES TO DO?

For maximum wear, save with Carmet—preformed to practically any shape or size! *Examples:* entire blanking die parts; inserts for drawing, heading, extruding and blanking dies; gauge and wear parts, pins, bushings, etc. *Supplied Preformed*—with minimum grind stock allowed, or precision ground and ready for use. Let us work with you . . . send us your drawings and specifications for quotations. ● *Allegheny Ludlum Steel Corporation, Carbide Alloys Division, Detroit 20, Michigan.*

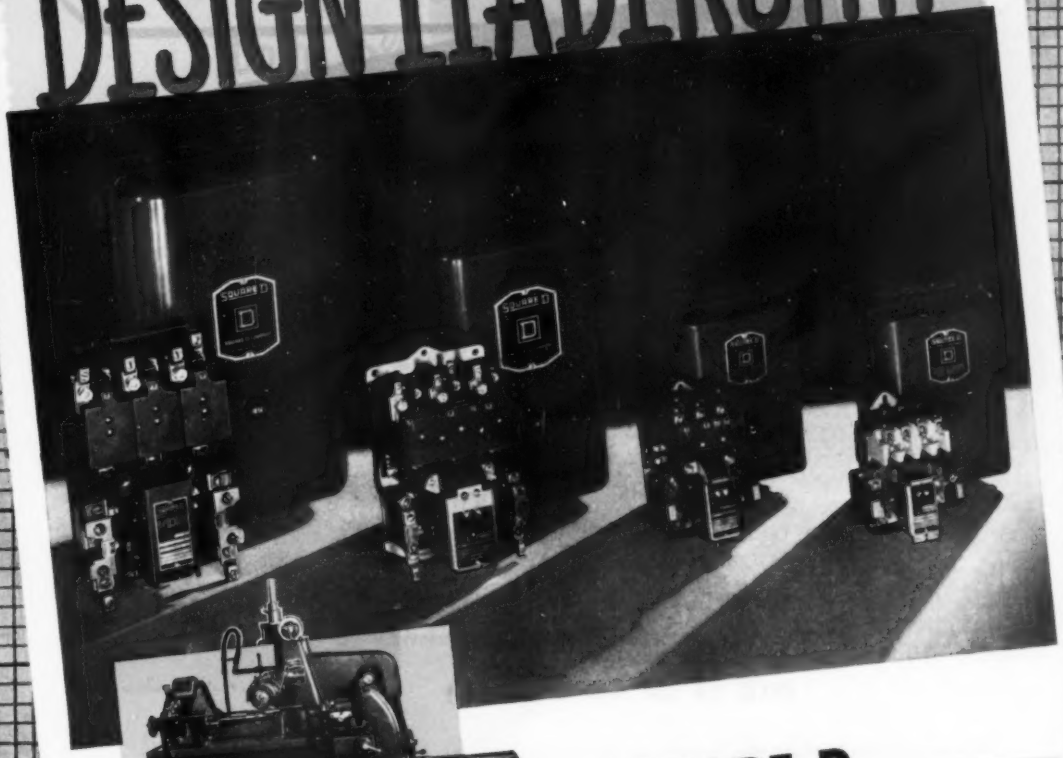
For complete MODERN Tooling, call

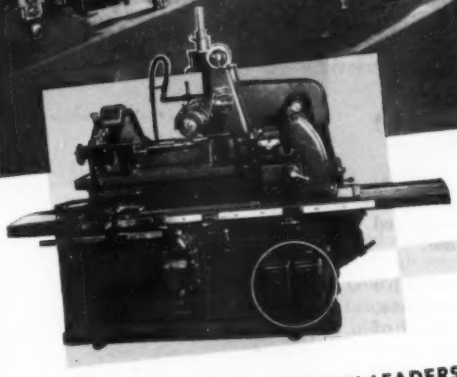
Allegheny Ludlum

AL FINE TOOL STEELS SINCE 1854

W&D 3486

DESIGN LEADERSHIP





SQUARE D MOTOR STARTERS

SQUARE D's DESIGN LEADERSHIP is reflected in important features:

Generous wiring space . . . simple contact change . . . easy coil removal . . . additional electrical interlocks . . . long life . . . NEMA standardization . . . simplified maintenance. These are features which add up to an ever-increasing preference for Square D motor starters.

Write **for BULLETIN 8536. Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin**

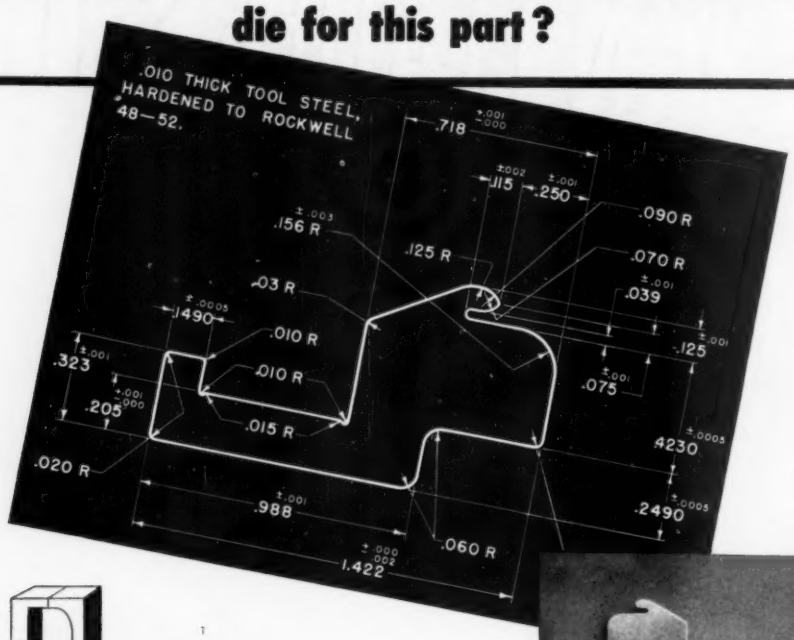
ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

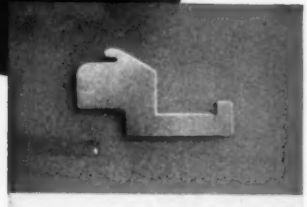
SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

How long would it take you to form grind a die for this part?





THE DUPLIform METHOD DID IT IN 40 HOURS!

This part had to be stamped from .010" tool steel hardened to Rockwell C-50. Tolerances had to be as close as plus or minus .0005", and edges free of burrs.

With the DUPLIform method, form wheel dressing and form grinding the high carbon, high chrome punch and die for this part required only 40 hours. A *sample part* was used as a template to form grind the die sections and the stripper. The stripper sections, in turn, were used as templates to form grind the punch. Tenth-splitting accuracy was achieved in fitting punch to die.

DUPLIform is the simplest, most accurate, most economical method of reproducing intricate form ground contours of extreme precision, combining, as it does, a profile surface grinder of tenth-splitting accuracy with a built-in universal dresser.

Write today for Bulletin 201.

AIRBORNE
ACCESSORIES CORPORATION
TOOL DIVISION
1414 Chestnut Avenue, Hillside 5, New Jersey

Up to 35% greater production, much longer tool life

with GULF "LASUPAR" and "ELECTRO" CUTTING OILS

Why have users of the new Gulf sulphurized cutting oils been able to step up feeds and speeds on tough machining jobs? Because, thanks to a special Gulf process of combining sulphur, Gulf Electro and Lasupar Cutting Oils provide greater sulphur activity over the entire range of a cutting operation.

This intensified chemical action insures better protection for the tool at elevated production rates—helps reduce built-up edge, prevents chip welding, prolongs tool life.

Because Gulf Electro Cutting Oil contains a larger percentage of this extremely active sulphur ingredient, it is recommended for the toughest machining jobs, where production and tool life are problems.

Gulf Lasupar Cutting Oil also contains stable sulphurized fatty oil, effective in producing the fine finishes for which this quality cutting oil is so well known.

Operators everywhere welcome the new Gulf Lasupar and Electro Cutting Oils—because they get all these production advantages without the disagreeable odor ordinarily associated with sulphurized cutting oils.

Call in a Gulf Lubrication Engineer today and arrange to use these outstanding oils in your shop. Or send the coupon below for additional information.

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PETROLEUM AND ITS PRODUCTS

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Please send me, without obligation, a copy of each of your new pamphlets "Gulf Lasupar Cutting Oil," "Gulf Electro Cutting Oil."

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Company .....

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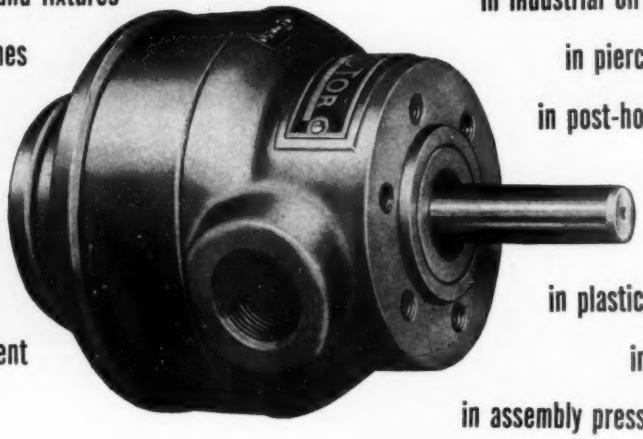
PERFORMANCE* is the pay-off!

in machine tools and fixtures
in die-casting machines
in elevators
in punch presses
in baling presses
in clamping fixtures
in testing equipment
in steering devices
in straightening presses
in material-handling equipment



in industrial oil burners
in piercing presses
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GEROTOR hydraulic pumps

* Pressures up to 1200 p.s.i. continuous, 1500 intermittent. Deliveries from .4 to 40 g.p.m.

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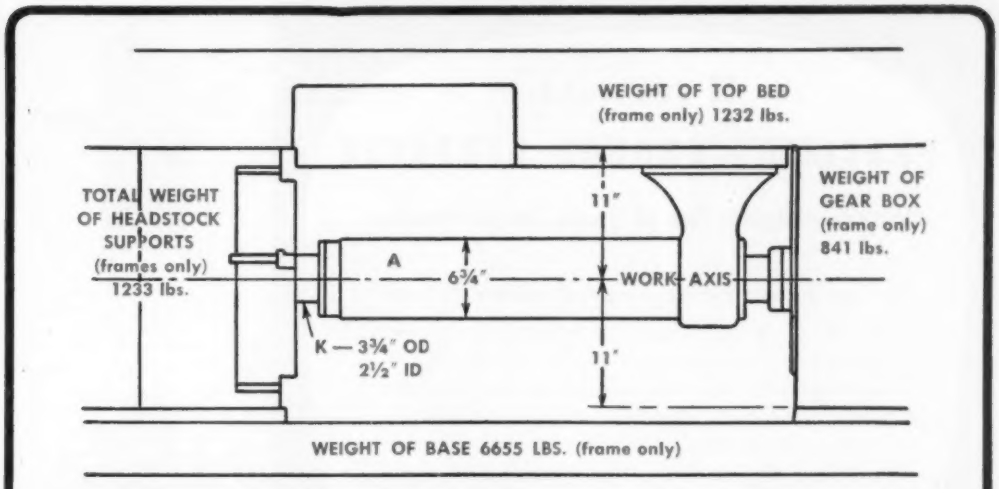


MAKER OF "HISTORIES"

The above drawing illustrates a Tooling Area that has staged many outstanding cases of machine adaptation and performance. Case histories are very useful as examples of machine adaptation, but their blanket use as unqualified proof of dependable performance is not convincing.

Buyers know that varying requirements and conditions of various plants make "buying what the other fellow buys" an unsafe practice. They know that good case histories will result if machine facilities have been properly selected. No plant could long afford to have it otherwise.

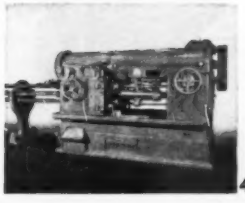
A "top performer" of the 1½" SIX SPINDLE CONOMATIC TOOLING AREA, shown above, is the MAIN END SLIDE. The specific data given tells why:

1. **It has a greater maximum load recommendation and a stronger frame support than the main end slide of any other "automatic".**

The 272 lb. alloy carburized steel Main End Slide, A, is 33⅝" long, and has a maximum load recommendation of 4800 ft. lbs. Its round surface is machined to close limits. It is supported in nickel iron, split, sleeves on the alloy steel Way, K, with a total bearing of 136.9 sq. ins.

2. **It handles more work; has more adaptable tooling positions, and more selective feeds, than the main end slide of any other "automatic".**

The 27⅛" tooling-length of the Slide handles shaft jobs up to 18" in length. The 2⅝" swing clearance permits die-head threading to full machine capacity in any, or all, six positions without Slide alteration. Nine pairs of pick-off gears give 68 feed changes for each work spindle speed.



Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

If you need

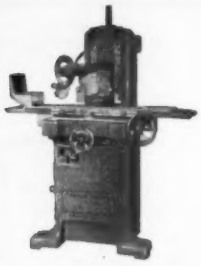
PRECISION GROUND SURFACES

See the complete line of Grand Rapids Grinders

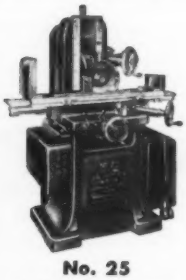
Tool room types — production types

In small job shops and in America's largest industrial plants, more and more Grand Rapids Grinders are delivering tool room accuracy with micro-inch finish at production speeds. Your inquiry about surface grinders or cutter grinders, tap grinders, drill grinders or combinations, will receive prompt attention.

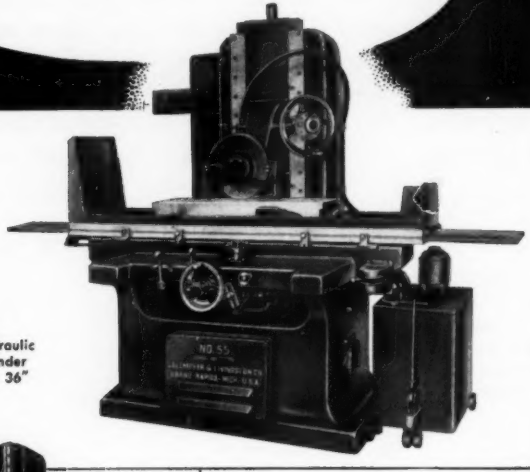
GALLMEYER & LIVINGSTON CO.
330 Straight Ave., Grand Rapids, Mich.



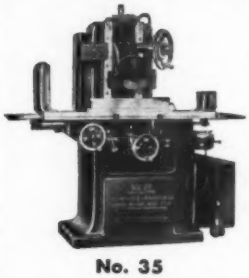
No. 20
Grand Rapids Hand Feed Surface Grinder
Size 6" x 10" x 18"



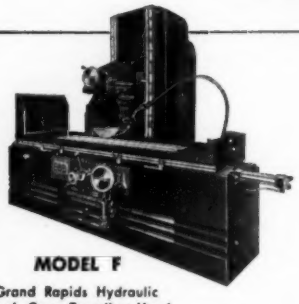
No. 25
Grand Rapids Hydraulic Feed Surface Grinder
Size 6" x 10" x 18"



No. 55
Grand Rapids Hydraulic Feed Surface Grinder
Size 12" x 17" x 36"

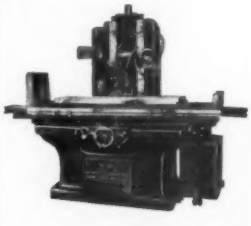


No. 35
Grand Rapids Hydraulic Feed Surface Grinder
Size 8" x 12" x 24"



MODEL F
Grand Rapids Hydraulic Feed, Cross Traveling Head Surface Grinder
Size 16" x 25" x 48" to 24" x 25" x 96"

GRAND RAPIDS GRINDERS



No. 65
Grand Rapids Hydraulic Feed Surface Grinder
Size 12" x 17" x 48"

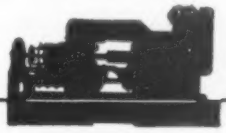
PROFIT BY OUR READY-MADE EXPERIENCE

There's nothing new to us about these munitions parts—or a hundred others in the same class.

In World War II, Acme-Gridley Multiple Spindle Automatics in Government arsenals, and in industry defense plants, turned out untold millions of these parts to Army, Navy and Aircraft specifications. The round-the-clock production line performance of these automatics is too recent to be forgotten.

Out of this vast experience we've again been alerted to set up even higher production standards for many kinds of Government defense work. Once again, the Acme-Gridley's constantly improved advantages for tooling, tolerances and faster production times are ready to meet these requirements.

Before you swing into action with your Acme-Gridleys, profit by our ready-made experiences. Save the cost of experimentation and the loss of precious time. Acme-Gridley standardized procedures and tooling can by-pass these losses for you. Just tell our engineering experts how they can help you—they'll do the rest.



THE NATIONAL ACME COMPANY

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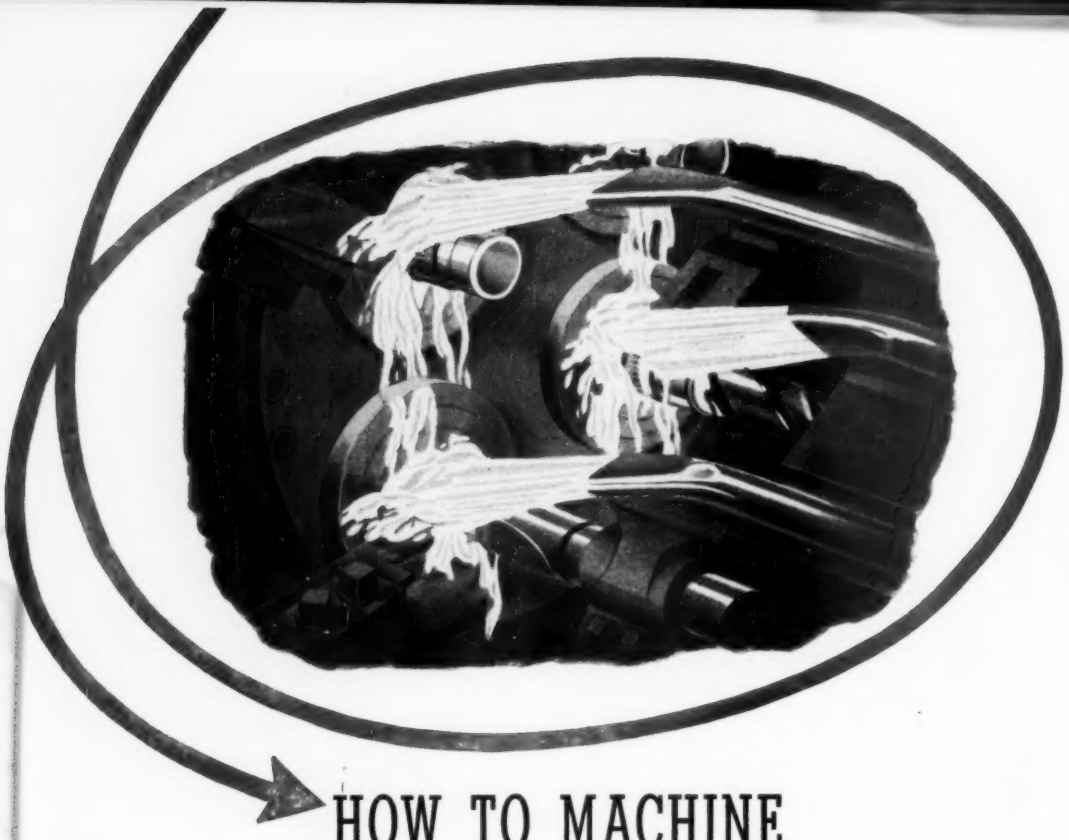
No other source offers a line so COMPLETE—so much design and tooling EXPERIENCE in Multiple and Single Spindle Bar and Chucking Automatics.



HOW TO MACHINE ALUMINUM FOR REARMAMENT JOBS

MACHINING IS EASY . . . Chip problems vary with alloys. Remember that alloy 11S-T3 is free machining . . . breaks readily into small chips. Tougher alloys, such as 17S-T4 and 24S-T4 require more attention to such details as rake angles and chip grooves, coolant and condition of tools. Increase rake angles to curl chips away from work. Chip-breaker notches, ground into tools or cams, will break tougher alloys into smaller chips. Use a larger volume of coolant to flush away chips and cool work and tools (thin, high-pressure streams won't do the job). Use drills with large polished flutes.

THE ANSWERS ARE HERE . . . In the free booklet, Alcoa Aluminum in Automatic Screw Machines, major attention throughout the 95 pages of text is devoted to tool design, set-up and operating techniques. Important points are fully illustrated with photographs and diagrams. Behind this helpful booklet is Alcoa's 63 years of aluminum experience. Get your copy by writing: ALUMINUM COMPANY OF AMERICA, 871D Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA

ALUMINUM SCREW MACHINE STOCK

ALCOA ALUMINUM

Low first cost—
low cost per ton
handled

HYSTER *Salsbury* Turret Trucks

- ✓ **SIMPLE TO OPERATE.** Anyone can drive a HYSTER *Salsbury* Turret Truck.
- ✓ **USES LESS THAN ONE GALLON OF GASOLINE** per average 8-hour shift.
- ✓ **GREAT MANEUVERABILITY.** 360° steering is done through the drive wheel.
- ✓ **FULLY AUTOMATIC CLUTCH AND TRANSMISSION.** No gear shifting, no levers. Provides the power required under ALL DRIVING CONDITIONS. The truck can be "inched" along or driven up to 8 miles per hour fully loaded; 10-12 miles per hour when empty. Operator rides, or walks alongside truck.
- ✓ **TURRET POWER UNITS** are interchangeable on all Turret Trucks.

HYSTER is one of the oldest names in the materials handling industry. . . . HYSTER trucks are sold and serviced by 52 dealers in the United States and Canada and by dealers in 58 foreign countries. Wherever you are, sales, service and parts are available on the Hyster line of industrial lift trucks, Straddle Trucks, Karry Kranes and HYSTER *Salsbury* Turret Trucks.

PALLET TRUCK. Transports loaded pallets weighing up to 4000 pounds. Several fork lengths. Hydraulic fork lift.

PLATFORM TRUCK. Handles loads of 4000 pounds on skids or tote boxes. Several lengths and widths. Hydraulic platform lift.

TUG. Tows trailer trains up to 20,000 pounds. Most maneuverable towing unit on the market.

CARGO TRUCK. Capacity 4000 pounds. Low platform makes bulky or heavy cargo handling easy.

HYSTER

HYSTER COMPANY

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Operator Either Rides or Walks . . .

HYSTER *Salsbury* Turret Trucks compare in cost to most "walker-controlled" trucks—with all the features of rider-operation.

These horizontal transporters handle any type of load up to 4000 pounds. They go anyplace where man-pulled or power-driven trucks of the "walker-controlled" type can go—and the operator EITHER RIDES OR WALKS.

HYSTER *Salsbury* Turret Trucks are basic machines for new materials handling plans—will fit into any existing system. In wholesale drug and grocery companies, automobile or aircraft plants, warehousing, docks, shipping terminals, refineries, produce markets ...anyplace where there is a need for fast, low-cost handling, Turret Trucks are in use. Tight quarters, narrow aisles and ramps are no problem for the Turret Trucks.

Grand way to cut range production costs

Progressive dies blanking and forming main top of Grand Range.

OUR new Cleveland Double Crank Press enables us to form every stamping used in Grand gas ranges—right here in our own plant. Wide bed area and exceptional clearance of the slide, when open, allowed us to redesign our dies for more economical operation," stated Mr. E. F. Kennedy, superintendent of Grand Home Appliance Division, Grand Industries, Inc. "Furthermore, our production can be readily stepped up by using two or even three progressive dies in this press at the same time. We expect further production economies, for we will be able to stamp several parts that are now fabricated. Our new Cleveland is helping to make Grand gas ranges a better product while at the same time cutting our production costs."

You, too, can realize similar savings in your production costs. Cleveland engineers have wide experience in all phases of the metal stamping industry. Why not call in a Cleveland engineer to study your production . . . find out how Cleveland Presses can reduce your production costs. Contact us today . . . no obligation.

A-4028

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ARE YOU SEARCHING FOR THE ANSWER?

U. S. DEPARTMENT OF COMMERCE
NATIONAL PRODUCTION AUTHORITY

E 32A—NATIONAL DEFENSE, APPENDIX

pter I—National Production Authority, Department of Commerce

[NPA Order M-30]

PART 34—TUNGSTEN

This order is found necessary and appropriate to promote the national defense and is issued pursuant to the authority of section 101 of the Defense Production Act of 1950.

In the formulation of this order, there has been consultation with industry representatives, and consideration has been given to their recommendations. However, consultation with representatives of all trades and industries affected in advance of the issuance of this order has been rendered [illegible]

chapter (NPA Regulation 2) cont[illegible] to apply to tungsten, but deliveri[illegible] DO rated orders will take on any [illegible] ther may be made only in a[illegible] ord- with allocation authorizati[illegible] s is- NPA, except as otherwis[illegible] pro- vided in this part. The NPA may [illegible] from time to time, issue directives as to [illegible] eliv- [illegible] of tungsten and, [illegible] less [illegible] herein, such [illegible] rec- [illegible] over the provision [illegible] of this part.

§ 34.3 *Definitions.* As used in this part:

(a) "Person" means any individual, corporation, partnership, association, or any other organized group of persons and includes any agency of the United States or any other government.

(b) "Manufacture" means to melt, alloy, mix, fabricate or process in any other [illegible] consume or otherwise employ [illegible] the co[illegible]

M–30
JAN. 22, 1951

of Class B high speed steel (12 percent or more tungsten content).

(c) **Effective March 1, 1951,** no person shall receive, from individual and from all sources, in any one month, more than 20 percent of his total requirements of high speed steel containing tungsten in the form of Class B high speed steel (12 percent or more tungsten content).

(d) **Effective March 1, 1951,** no person shall place orders for or shall accept delivery of high speed steels containing tungsten except for actual use: *Provided, however,* That this prohibition shall not apply to steel distributors, [illegible] to extend to steel distributors, [illegible] to place their orders [illegible] in this paragraph [illegible] who

(e) The restrictions [illegible] in this section shall not apply to persons who use not in excess of 500 pounds [illegible] Class B high speed steel (12 percent [illegible]) during any [illegible]

Here's the Answer...

For "at least 80% of your high speed steel requirements", Firth Sterling offers these fine quality steels:

Circle-M Super High Speed Steel — the PREMIER Moly-Cobalt high speed steel (Type M-36). This steel can be used at 20-25% higher speeds than used for ordinary high speed steels. Circle-M has a good red-hardness value and is highly abrasion-resistant. Write for Bulletin SL-2032.

Star-Mo M-2—an improved 6-6-2 tungsten-molybdenum type of high speed steel developed for general use on machining operations. Write for Bulletin SL-2015.

Hi-Mo High Speed Steel—the standard 8-4-2 moly-chrome-tungsten type that has the combined features of excellent toughness and low hardening heats.

M
CIRCLE M

Memo

TO---Users of High Speed steel
SUBJECT---Experience with Moly Steel

Firth Sterling has been known for years as a leading producer of the tungsten types of high speed steels. The tungsten steels Circle-C and Blue Chip are world famous and Firthite, sintered tungsten carbide, is used in metal working shops everywhere...

BUT . . . 47% of Firth Sterling's 1950 production (a record peacetime year) consisted of Moly-type steel.

R327

Firth Sterling
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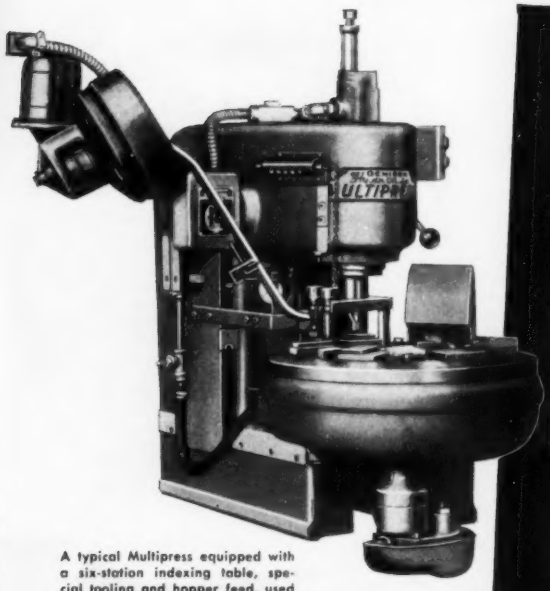

A typical Multipress equipped with a six-station indexing table, special tooling and hopper feed, used to rivet electrical contacts on brass and spring steel contact arms.

MULTIPRESS is the answer to FASTER BETTER SAFER PRODUCTION for hundreds of operations

With Accurate Pressure Control Plus Wide-Range Adjustability, Multipress Offers Unique Production Advantages

SMOOTH, ACCURATE, OIL-HYDRAULIC ACTION, specially engineered for production speed and efficiency, plus quick, easy, wide-range adjustability! That's what enables Multipress to make cost-cutting news on so many different types of jobs!

More than *six-thousand Multipresses* now offer working proof of this ability to speed production, improve quality, reduce rejects and scrap losses, increase safety, cut worker fatigue, reduce die wear, and slash costs.

A quick review of a few Multipress features will show why!

Pressure is infinitely adjustable, within the full pressure range of the press.

Pressing and approach speeds can be adjusted separately, to combine rapid traverse with controlled working speeds.

Ram stroke can be preset for either distance or pressure limits.

Controls for time delay, or ram dwell, and many sequence requirements are available.

Exclusive Multipress Vibratory Ram Action—ram effort applied in a series of short, rapid, full-tonnage strokes in each cycle—is also available.

Multipress can be equipped for either manual or automatic ram control, with dual levers or push buttons for extra safety.

Highly compact Multipress design requires minimum floor space and head room . . . gives maximum advantage in locating parts bins, tote boxes, hopper feeds, conveyor equipment, and other accessories.

Indexing tables and dial feed tables for feeding parts to the press ram automatically, are standard Multipress accessories. Others include harmonic stock feed, straightening fixtures, pelleting equipment, and a foil marking attachment.

• • • •

Multipress is tailored to individual production needs, in eight different frame sizes, with capacities from 1 ton up to the 50-ton range. For more information, write The Denison Engineering Company, 1164 Dublin Road, Columbus 16, Ohio.

DENISON HydrOILics

8-ton Multipress used by famous radio maker in producing speaker assemblies.

A 4-ton Multipress with Index Table broaches serrations on small cams.

A 25-ton Multipress with Index Table assembles screws in insulator bases.

AIR TOOLS ENABLE WORKMEN TO PRODUCE MORE WITH LESS EFFORT

That's why, under today's conditions, compact, powerful Ingersoll-Rand Air Tools now pay for themselves nearly twice as fast as a few years ago.

IMPACTOOLS	threaded fasteners up to 4" diameter
RIVETERS	rivets up to 1¼" diameter
DRILLS	up to 3" diameter in steel
REAMERS	up to 4" diameter in steel
TAPPERS	up to 4" in steel
TUBE ROLLERS	up to 6" diameter
CHIPPING HAMMERS	cleaning castings, chipping plate and tubing
GRINDERS	up to 8" diameter wheel size
TAMPERS	for compacting foundry sands and backfill materials
SCREW DRIVERS	screws up to 5/16" diameter
AIR HOISTS	up to 20,000 lbs.
DIGGERS	for hardpan, clay, gravel, frozen ground, etc.
SUMP PUMPS	up to 250 gallons per minute
SCALING HAMMERS	cleaning rust, scale, paint, etc.
CONCRETE VIBRATORS	for stronger, more uniform concrete

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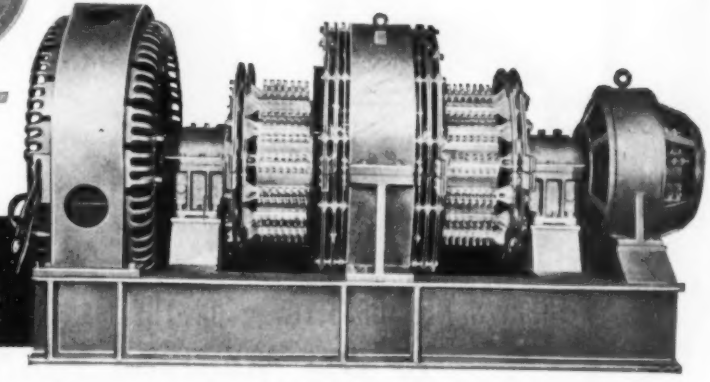

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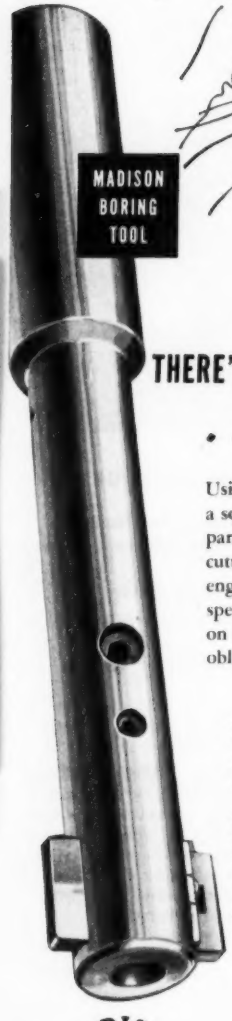

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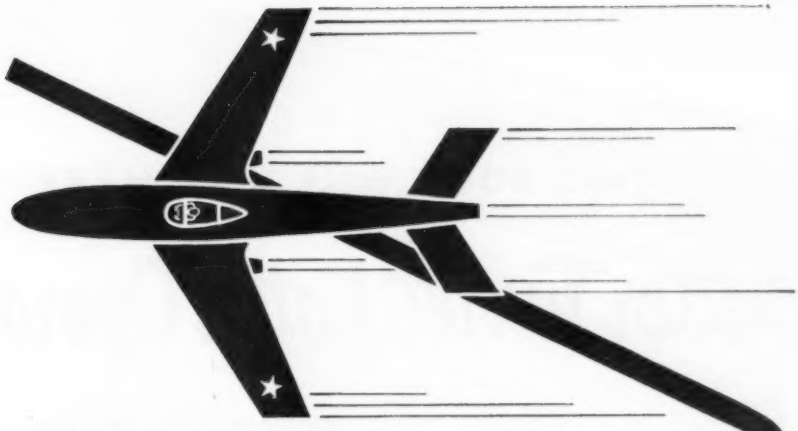

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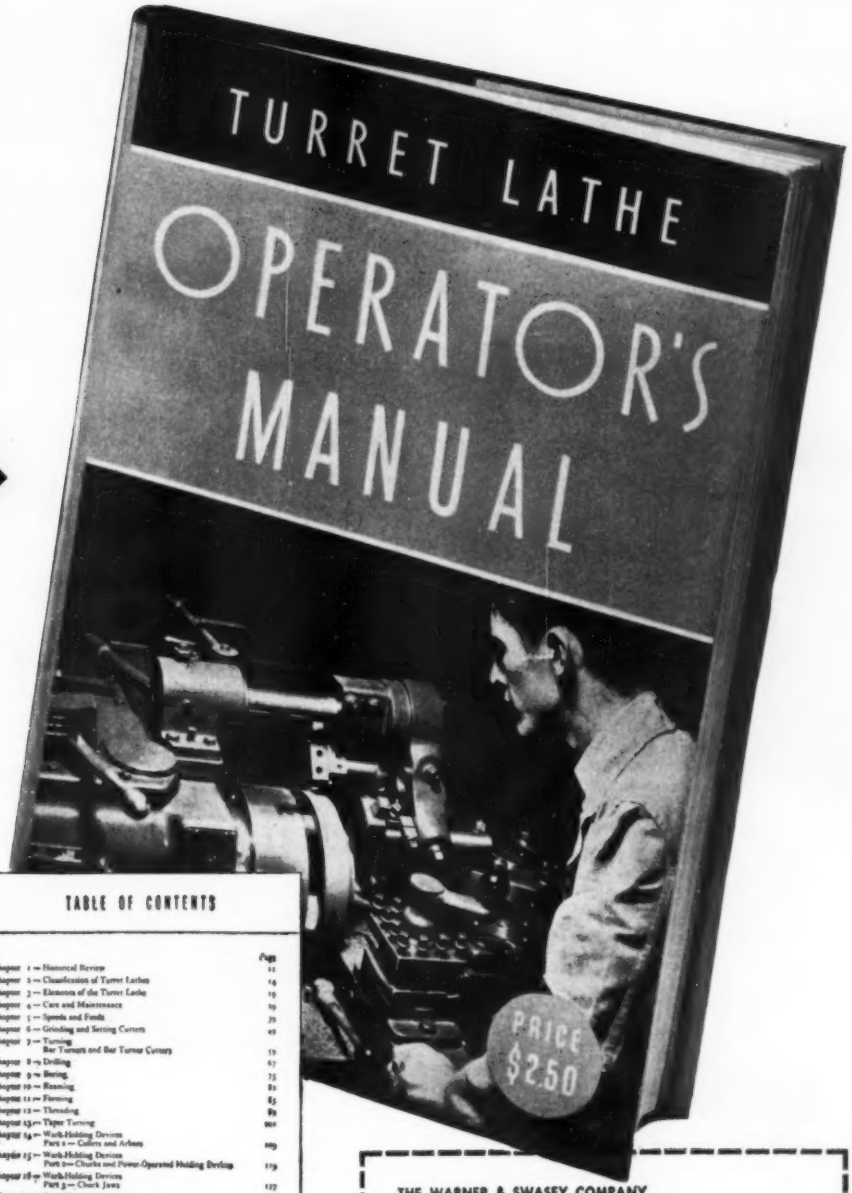

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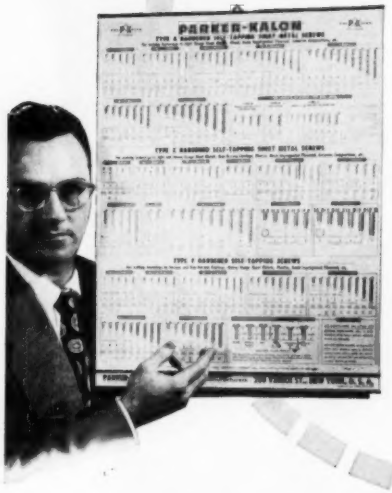

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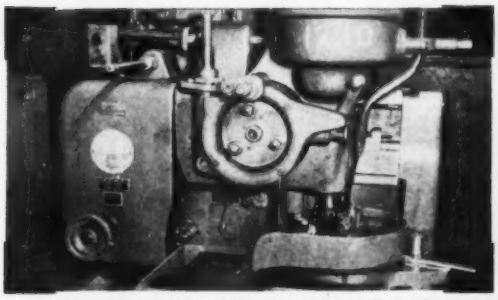

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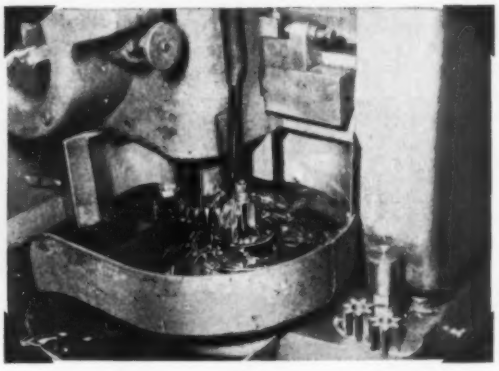

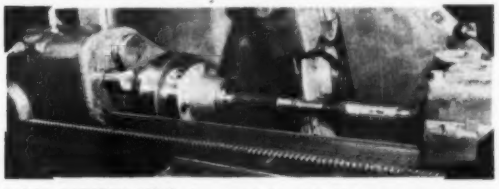

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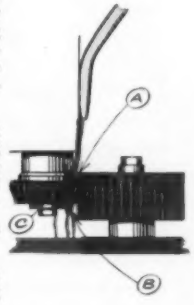

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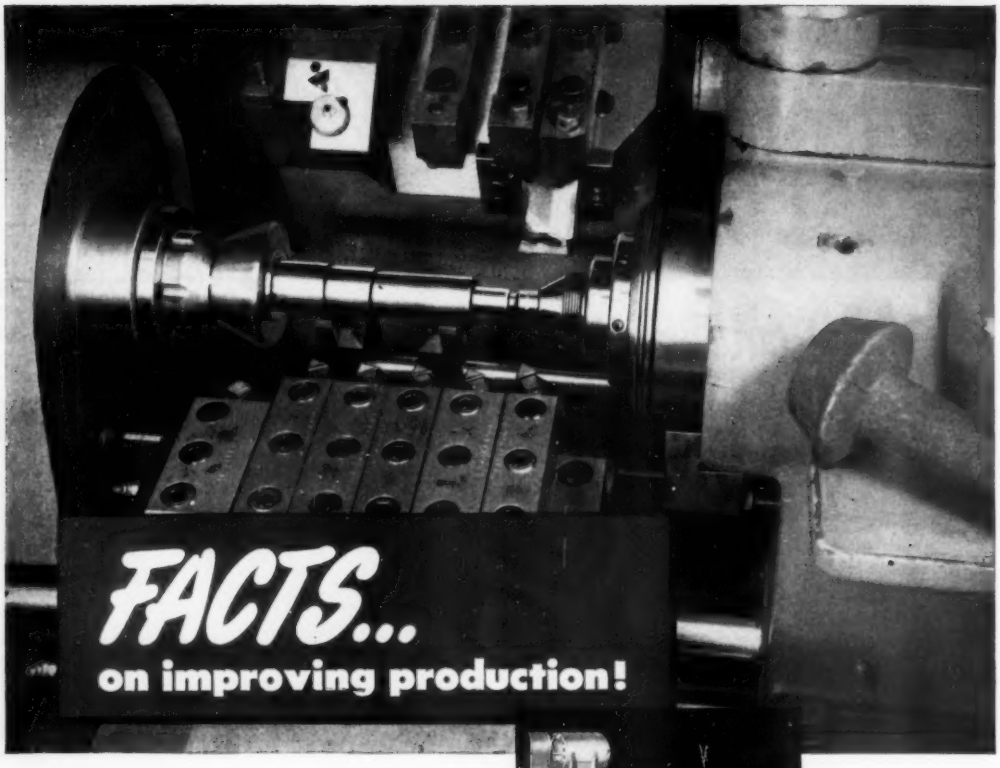

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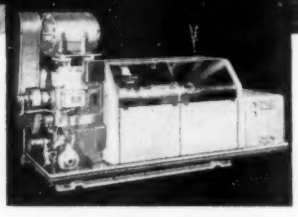

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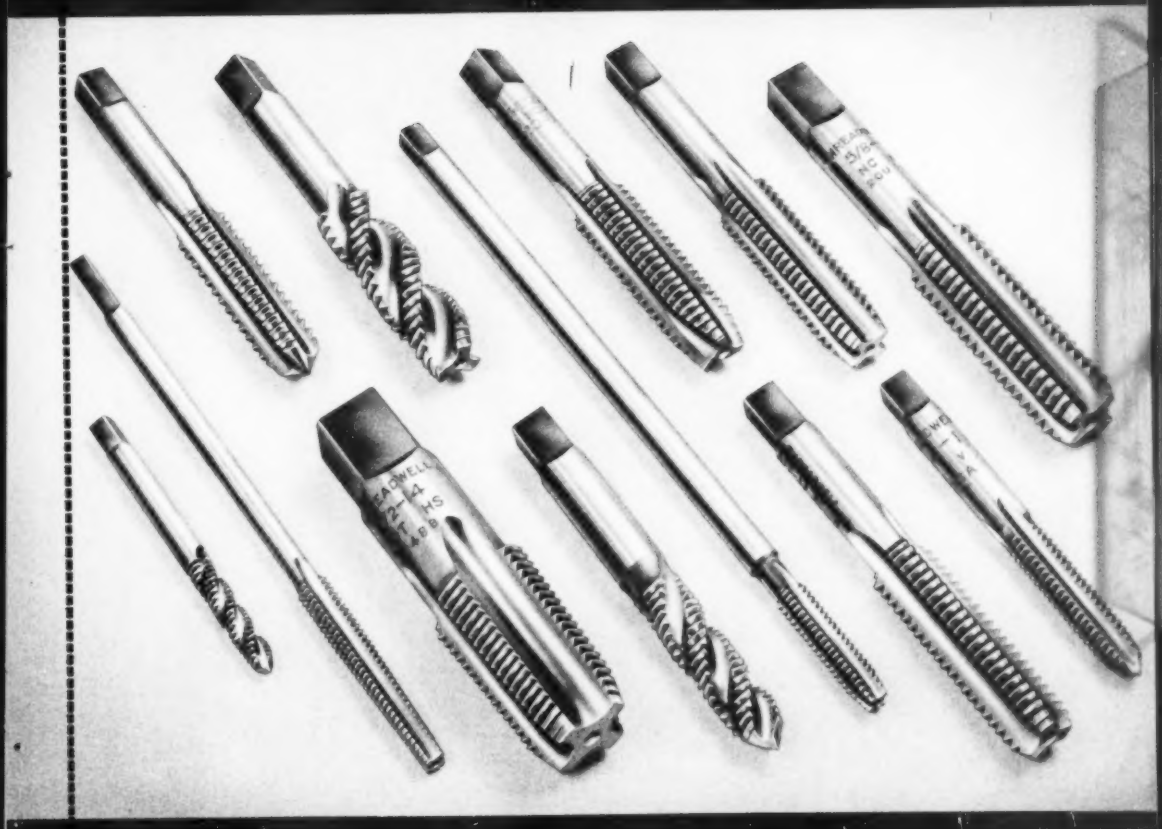

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MACHINE SCREW NO.	0	1	2	3	4	5	6	8	10	12	14
DECIMAL SIZE	.060	.073	.086	.099	.112	.125	.138	.164	.190	.216	.242
FEET PER MIN.	REVOLUTIONS PER MINUTE										
20	1273	1046	888	772	682	611	554	466	402	354	316
25	1592	1308	1110	965	853	764	692	582	503	442	395
30	1910	1570	1332	1157	1023	917	830	699	603	531	474
35	2228	1831	1555	1350	1194	1070	969	815	704	619	552
40	2546	2093	1777	1543	1364	1222	1107	932	804	707	631
45	2865	2355	1999	1736	1535	1375	1246	1048	905	736	710
50	3183	2616	2221	1929	1705	1528	1384	1165	1005	884	789
55	3501	2879	2443	2122	1876	1681	1522	1281	1106	973	868
60	3820	3139	2665	2315	2046	1833	1661	1397	1206	1061	947
65	4138	3401	2887	2508	2217	1986	1799	1514	1307	1149	1026
70	4456	3663	3109	2701	2387	2139	1938	1630	1407	1238	1105
75	4775	3924	3331	2894	2558	2292	2076	1747	1508	1326	1184
80	5093	4186	3553	3086	2728	2445	2214	1863	1608	1415	1263
85	5411	4448	3775	3280	2899	2597	2353	1980	1709	1503	1342
90	5730	4709	3997	3472	3069	2750	2491	2096	1809	1592	1421
95	6048	4971	4219	3665	3240	2903	2630	2213	1910	1680	1499
100	6366	5232	4442	3858	3410	3056	2768	2329	2010	1768	1578
110	7003	5756	4886	4244	3751	3361	3045	2562	2211	1945	1736
120	7639	6279	5330	4630	4093	3667	3321	2795	2412	2122	1894
130	8276	6802	5774	5016	4434	3973	3598	3028	2613	2299	2052
140	8913	7325	6218	5402	4775	4278	3875	3261	2815	2476	2210
150	9549	7849	6662	5787	5116	4584	4151	3494	3016	2653	2368

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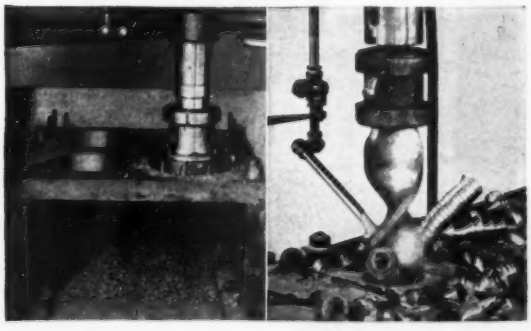

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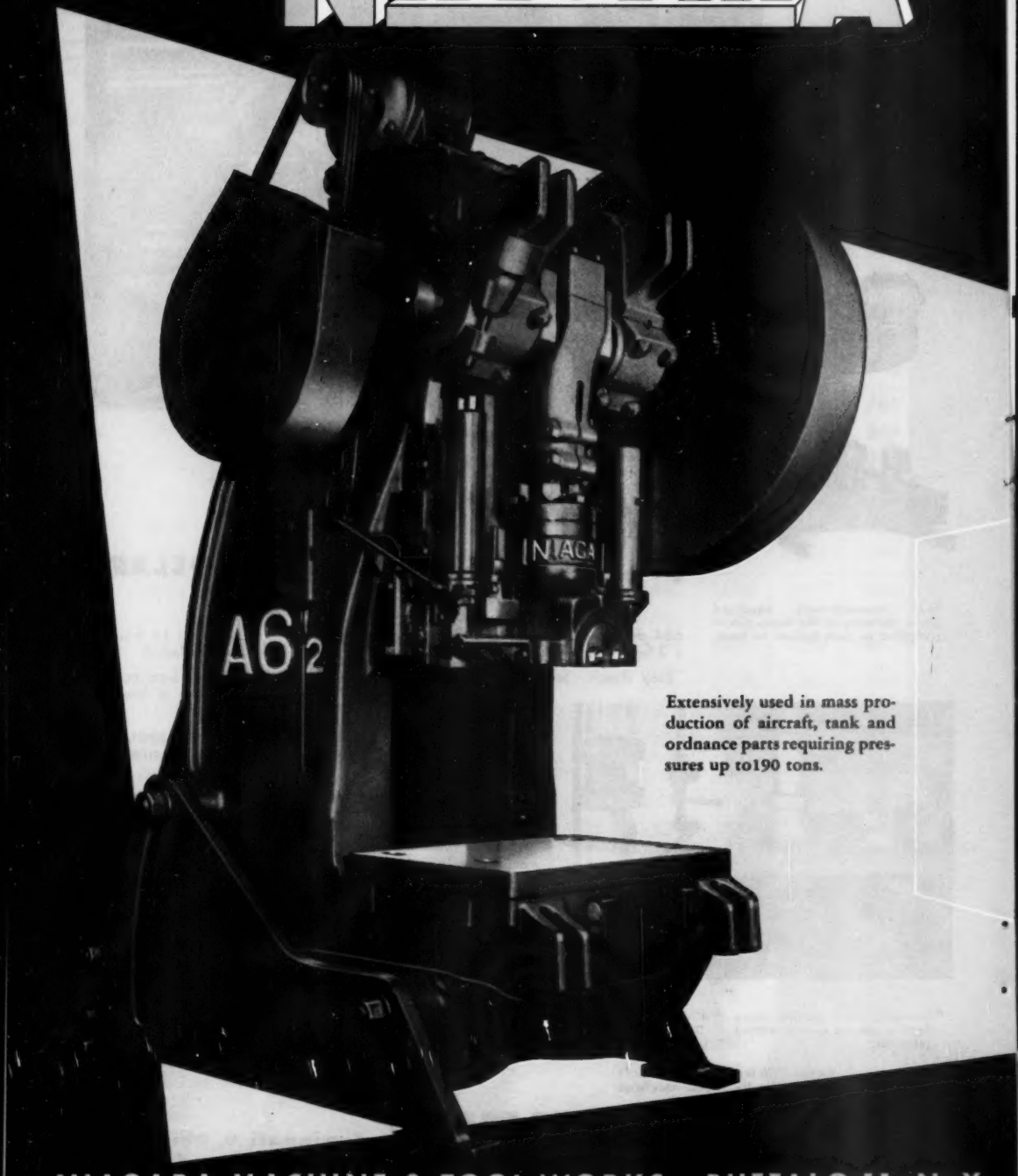

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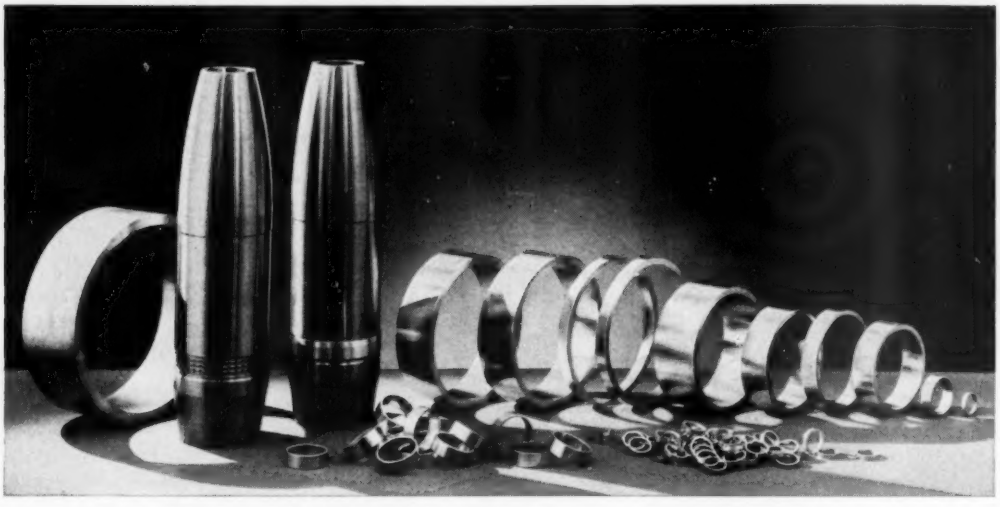

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EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

20-50× Life?

. . . The article in the March 5 *American Machinist*, "Thread Chasing—How to Do It", has aroused considerable comment here, but exception has been taken to the statement on page 128 that circular chasers have 20-50 times the life of flat tangent chasers. I believe that this must be an error or a misprint. One could compute mathematically 2-5 times perhaps, but I think that this would be stretching it a bit in actual practice.

Perhaps the statement that circular chasers have 20-50 times longer life than ordinary chasers would be

closer to being acceptable if the term "ordinary" were qualified. Obviously a circular chaser of 1-in. dia could have a periphery of no more than 3.1416 in. 270° of this, available for usable threading life, can be no more than 2.3562 in. A tangent chaser for a head of similar capacity has at least 1 in. of usable thread form. On the basis of this arithmetic alone, it is apparent that 2 or 3 times usable life is the most that could be claimed.

Radial insert chasers sometimes have usable thread forms of as little as ⅛ in. Based on the above, circular chasers have available about 18 times the thread form available for use in this type. On milled radial chasers, face grinding is impossible, and a chamfer grinding operation is used. This involves very complicated computation to determine the amount to be ground off on the average, etc. Even these do not qualify the "20-50" statement.

Name Withheld

Strive and Succeed

There has been talk about the old-timers not being worth much to present-day industry, but I wonder where the younger set would be if it were not for the long hours and vast head-scratching (maybe the reason some of us have bald spots) of some of the pioneers who are still in service.

Here is a case to illustrate the point: A large steel company engaged in rolling stainless broke the neck off a 22-in. finishing roll. The roll was still valuable, so they decided to shorten it to use in another operation. It was about 8 ft long, so they had to cut through the barrel. The roll was set up in a large lathe, and a special cutoff tool was purchased.

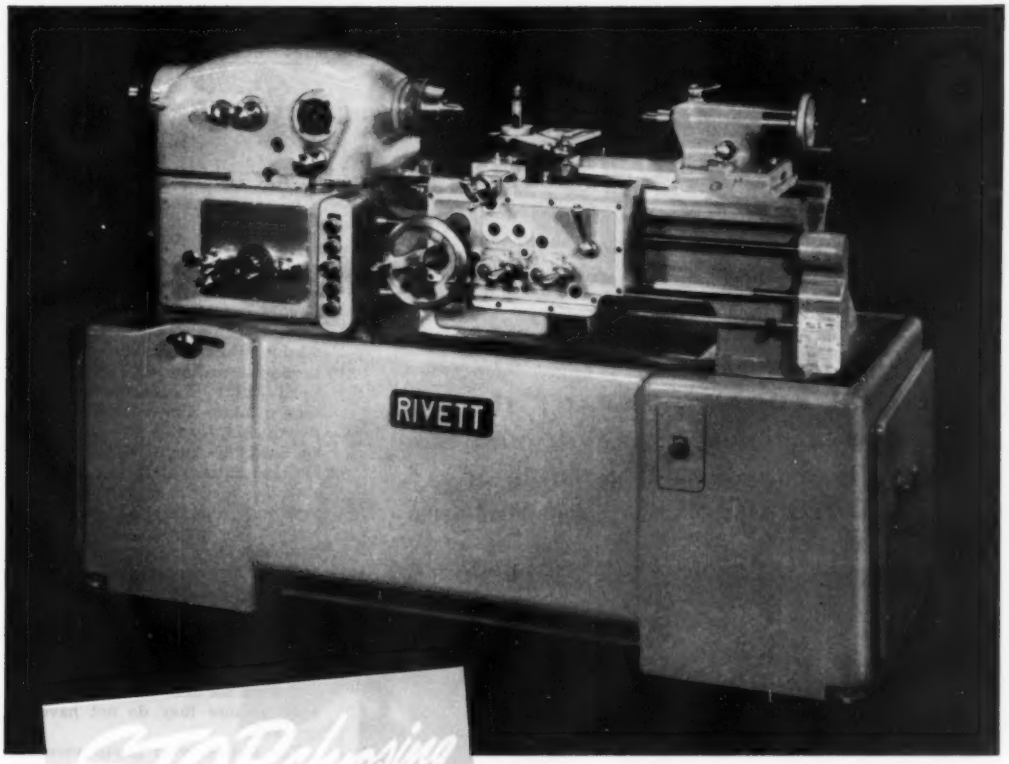
Now came the time when executive blood vessels started bursting. The roll had become work-hardened, and the cutoff tool would not cut. They tried softening the surface with a blowtorch, turning the work at a slow speed; but at the end of 40 hr, the cut was only 3 in. deep, with 16 left to go. Finally, the company figured the cost at that rate, and found that the cutoff would cost more than a new roll. They thought they were licked.

But an old hand, 74 years old, said he could cut it off. He claimed he could build a power saw like nothing else in the world, and as it would not cost the company any more, they told him to go ahead and try.

He built the saw and cut the end of the roll in 6 hr. The blade he used was still sharp when the cut was finished. Well, quite a few people, including a couple of college engineers and several journeymen machinists, watched the demonstration, but could not discover how the saw worked.

In another demonstration, a machine power saw made by a progressive company was tried on a bulldozer blade, which it cut in 305 strokes with 24-lb pressure. When placed in the new saw, the bulldozer blade was cut through in 172 strokes with only 4-lb pressure and a 1/3-hp motor. The old man has since made a patent application on the saw to go along with eight other patents he holds.

This old man tried to do his bit during the war by training machine-shop workers for 26 months with a total enrollment of 620 students, 93% of which made good in this new life work. Sixteen became shop foremen, and seventeen became instructors in another shop. This man per-



STOP choosing work for a lathe!

The NEW RIVETT 1020S

TOOLROOM LATHE

Turns anything it can swing!

There's no problem in selecting types of work to suit the lathes in your shop when you have 1020S Riveits. This double-duty machine combines the extreme precision of an instrument lathe and the ruggedness of an engine lathe. Feather-touch sensitivity at high speeds; rugged power in back gearing—it qualifies for any toolroom turning within its 12½" swing and 20" centers.

Features at left indicate how outstanding the new 1020S lathe really is—for further proof of how outstanding it would be in your shop, write for Bulletin No. 1020A.

RIVETT 1020S has what it takes to make an outstanding lathe!

40% heavier than comparable lathes. Weighs 4000 lbs. Back gearing for power cuts—belt drive for high speed. Range from 22 to 3600 R.P.M. 12¾" wide hardened steel ways of bed absorb heavy cutting force. High spindle speeds through mechanical drive. Push button controls for complete operation. Neutral clutch stops spindle without stopping drive. Three bearing mounts for spindle. Collets mount directly in spindle. Hand wheel for turning headstock spindle. Anti-friction bearings used throughout. Gear box gives 72 feeds and 84 threads from 2 to 240 per inch. Automatic lubrication. Hardened and ground feed screws.

RIVETT

LATHE & GRINDER, Inc.

Dept. AMR-4 Brighton 35, Boston, Massachusetts

For More Precision Work *RELY ON RIVETT LATHES AND GRINDERS*, The Master Craftsman's Master Tools

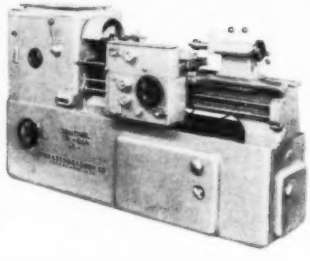
Focusing Lens Mount

11-START THREADS produced in 9 SECONDS per PIECE

EASTMAN KODAK COMPANY threads focusing lens mount speedily and economically with the Cri-Dan High Speed, Semi-Automatic Threading Machine.

THREADING DETAILS

Part	—Focusing Lens Mount
Material	—Aluminum Alloy
Thread	—11-start 32P LH
Length of Thread	—External ¼" Internal ½"
No. passes	—10
RPM	—550
Threading Time	—9 seconds per piece

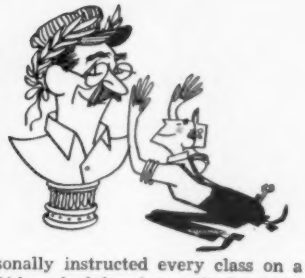


IF YOU DO THREADING up to 4" external—6" internal, investigate the Cri-Dan Threading Machine.

Contact your Lees-Bradner representative.

The LEES-BRADNER Company

CLEVELAND 11, OHIO, U.S.A.



sonally instructed every class on a 24-hr schedule, also worked a 12-hr teaching shift, then took a 3-hr rest, then spent an hour or more with the third shift, then got some more rest, then spent an hour or more with the fourth shift for five days per week. On Saturdays and Sundays, he spent his time puttering around, repairing tools damaged during the past week, and never lost a single shift from any cause.

Wonder how much tailbone the younger men would have left after dragging around that long? Now, as to my observations as to the learning ability of the different age groups:

The uneducated, 40 to 50 years old, learn the most thoroughly, probably because they do not have to unlearn.

The 20-to-40 year group were the next best, especially in their mathematics.

The 18-to-20 group learned fast, but could not reason why; nor could they make much headway in their mathematics. I think this was because they did not think it important to learn when they went to school.

In this school all students were taught to work all problems by mental arithmetic. At the end of each class the students were graded on their work, and the best was promoted to an instructor for the next class. Believe me, they worked hard to beat the head of their class, and also enjoyed it! When they got their certificates of graduation, they were ready to answer any questions without waiting for a textbook for reference.

Clark Gilbert
Bridgeport, Ohio

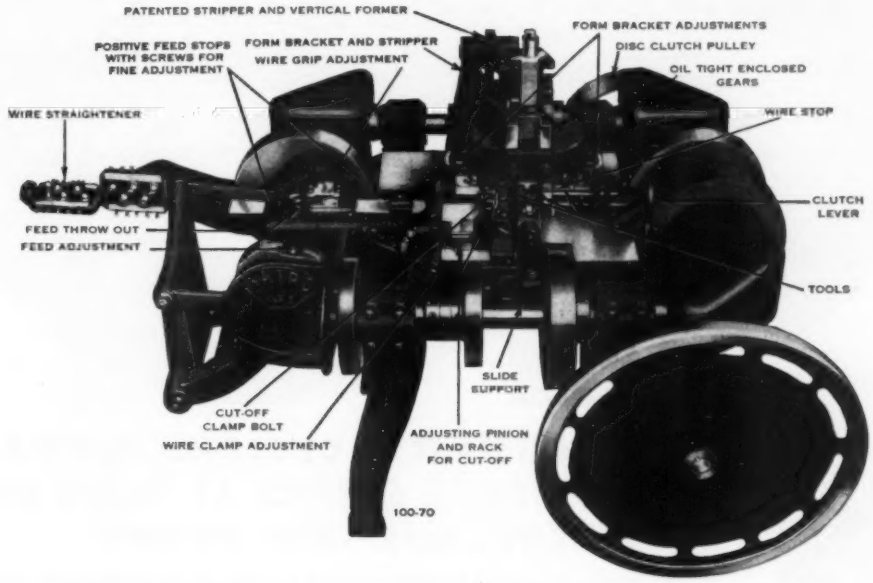
Drilling Long Holes—But Not Too Long

There was a slight (but rather obvious) printer's error in my article on drilling long holes (*AM*, Aug 7 '50, p 121). The length of the holes (first sentence) should have been 3-4 inches long and not 3-4 feet long.

H. G. Frommer
Milwaukee, Wis.

ASK **BAIRD** ABOUT IT!

HIGH PRODUCTION TOOLING



WIRE FORMS and COILED STRIP WORK *"unlimited"* with BAIRD FOUR SLIDE Automatics

The FOUR SLIDE is actually a basic design of machine, not a jack-of-all-trades, but one which we stock and tool to your specific requirements for high speed repetitive production. There are 8 standard sizes that cover wire diameters from 1/32" to 1/2" and ribbon widths from 3/16" to 1-3/8" . . . larger capacities on special order.

Machines may be supplied with crowned pulley for V belt drive from countershaft, or with standard or variable speed motor drive mounted directly on the machine . . . V belt from motor sheave to machine pulley. Operation is smooth and quiet.

Tooling possibilities are extensive and can still be increased by the ingenuity of the toolmaker.

Standard attachments are Form Raising, Pin Pulling, Ring Setting and Horizontal Presses. Special attachments will be designed and built to suit specific jobs.

To discover how you can cut costs with this Four Slide machine . . . "ask Baird about it."

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS

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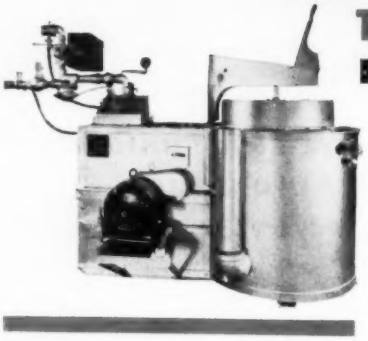
HERE'S HOW...

LINDBERG CYCLONE FURNACES TEMPER SCREWS AT $0.000 093 6 FUEL COST PER POUND



Lindberg Cyclone Furnaces can help reduce the costs and improve the quality of your tempering, annealing, nitriding, stress-relieving and non-ferrous heat-treating. Bulletin 53, "*Lindberg Gas Fired Cyclone Tempering Furnaces,*" tells how. Ask for it. (Bulletin 14 covers *Electric Cyclones.*)

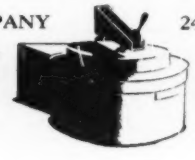
Lindberg Steel Treating Co., Chicago, the world's largest custom heat treating organization and companion company to Lindberg Engineering Co., uses twenty-nine 100% forced-convection Lindberg Cyclone Furnaces for low-cost production tempering of many jobs—from tiny screws to 4 ton charges of forgings.

Here is one typical job, self-tapping screws tempered in one of the nine furnaces shown above (the third one from the front—it has a work chamber 22" in diameter by 26" in depth). Note the low unit cost.

FUEL COST	$0.000 093 6 PER LB.
Weight of charge	1019 lbs.
Temperature	600° F.
Time in furnace	65 minutes
Fuel consumed	159,000 BTU (1.59 Therms)
Fuel cost @ 6c Therm	9½c

Hardness is easily controlled to plus or minus 1 Rockwell "C." Heating is rapid and uniform. Heat is generated in a *separate* chamber away from the charge, *then* circulated by blower through all parts of the work chamber. All work is uniformly heated at the same instant—radiant heat does not reach outside of charge first . . . and center last.

LINDBERG ENGINEERING COMPANY 2445 W. Hubbard Street, Chicago 12, Illinois

LINDBERG  **FURNACES**

SPOT NEWS of Metalworking

- **Synthetic pearl-chrome baked resin coating** is being used instead of nickel for trim on some car parts and trucks. Aluminum in finely divided leaf form is the color pigment. One pound of aluminum is said to protect trim on 40 cars. Formerly it took 170 lb. of nickel to electroplate the same parts.

- **Cost of area-wide pension plan is tax deductible.** Bureau of Internal Revenue has ruled in case of 70 Detroit tool and die shops which have made agreement with UAW-CIO.

Forging die wear can now be detected before it becomes too excessive for economical repair through observations made on dynamic balancing machines. One auto maker is watching results on crankshaft balancing units, finds early detection and correction of forging-die wear gives three to five times more die life.

- **UAW-CIO hopes to build up $15 million strike fund by 1955,** when auto contracts expire, by increasing dues to $2.50 monthly. Added income also will provide $1.5 million a year for "citizenship" (political activity). Besides higher wages, UAW-CIO at its Cleveland convention went on record for guaranteed annual wage, $200-a-month pensions, and union shop.

- **Sheet steel blanks, which used to go back to mills as scrap** after stamping operations, are now being employed for small stampings and small fabricating work.

- **Ceramic-tipped cutting tools using sintered alumina** have been introduced to the British metalworking market. These tools are reported to be the only suitable means for cutting graphite. They also are very satisfactory in machining highly abrasive materials, such as plastics (especially those filled with wood, fibre or asbestos). Though ceramic cutters are not yet applicable to cutting steel, they are adaptable to aluminum, brass and other non-ferrous metals.

- **Nash-Kelvinator will build at its Kenosha, Wis., plant** a modernized version of the 2500-hp Pratt & Whitney "Double Wasp" engine used extensively during World War II and currently standard for Air Force and Navy aircraft.

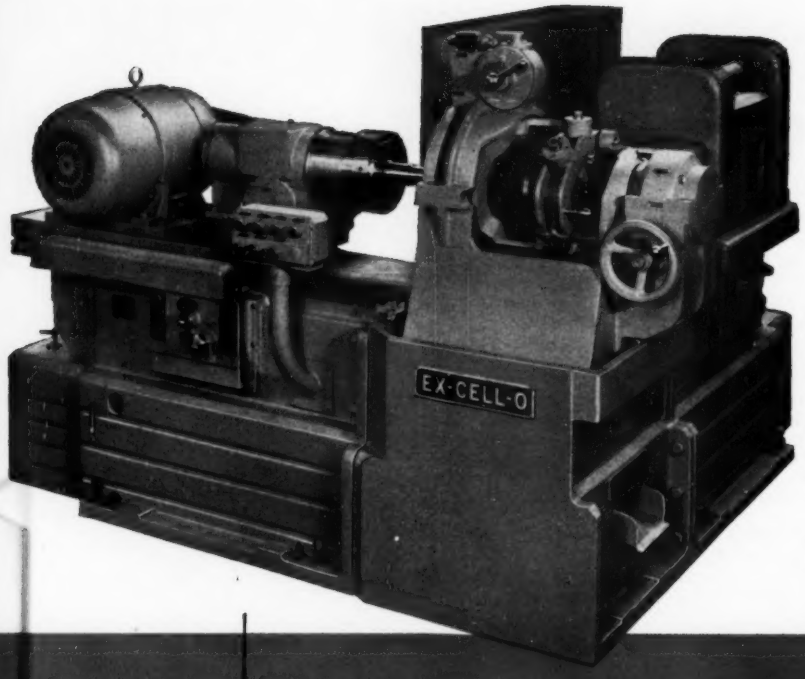
- **A piecework incentive plan is being installed** at General Electric's transformer plant at Oakland, Calif., which is being reopened as result of UE's acceptance of GE's last offer prior to management's announcement of permament closing of the plant. Union members had conducted four-months' strike against an incentive plan similar to those in other GE plants.

Stove and refrigerator makers are experimenting with bronze finish as substitute for chrome-plated parts. New finish looks like burnished gold. It is an alkyd resin finish coated with clear, synthetic, hard-wearing, baked-on material.

- **New synthetic rubber, Lactoprene BN, is suitable for oil seals** for auto transmissions, refrigerant seals, gaskets and linings for fuel tanks. It has special resistance to dry heat, water, oils, below-zero temperatures and aging. It is a development of Philadelphia laboratory of U. S. Department of Agriculture.

- **Hot dimpling is being used more widely in aircraft industry** to prepare aluminum alloys and lighter-weight magnesium sheet for flush riveting. Controls adaptable to standard squeezing machines have been developed by Aircraft Tools, Inc., Los Angeles. They operate in conjunction with special dies. It is believed that titanium alloys also can be hot-dimpled with existing control units.

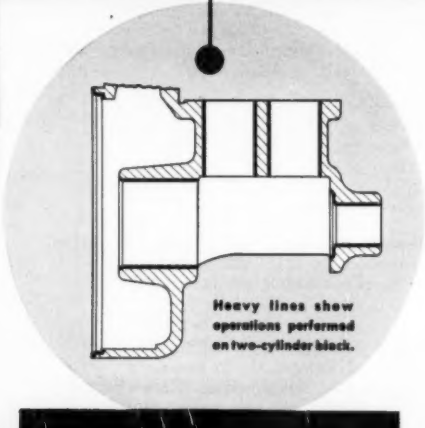
- **General Electric plans to build an "Appliance Park" in the Middle West,** similar to Nela Park (lamps) at Cleveland and Electronics Park at Syracuse, to manufacture major appliances. New facilities will be used at first for war-goods production. Louisville is among cities being considered as site.



Ex-Cell-O Two-Way Precision Boring Machine, with fixture that accommodates two- and three-cylinder in-line refrigerator compressor blocks; four- and six-cylinder V-type blocks.

XLO
EX-CELL-O for PRECISION

EX-CELL-O WAY MACHINE BORES CYLINDERS AND CRANK BEARINGS SIMULTANEOUSLY



Heavy lines show operations performed on two-cylinder block.

ACCURACY OF 90° ANGLE IS BUILT INTO MACHINE

This Ex-Cell-O Way Machine precision bores cylinders and crankshaft bearings of refrigerator compressor bodies, holding a 90° angle between the bores within .001″ in 14″. When operations from two directions are performed on one machine the possibility of error in relocating and reclamping the part for each operation is eliminated. Thus the accurate relationship of one operation to another is built into the machine. And of course, doing the operations simultaneously saves time and money too.

Ex-Cell-O Way Type Precision Boring Machines are built up by combining standard way units with a center section and adding tooling to fit the job. Standard way units are economical, self-contained, and can be used over and over again in different combinations. For full information, contact your local Ex-Cell-O representative, or write Ex-Cell-O in Detroit today.

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

51-2

MANUFACTURERS OF PRECISION MACHINE TOOLS • CUTTING TOOLS
RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • AIRCRAFT
AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT

Washington

Mobilization is in danger of slow strangulation. Overconfidence is the root cause—overconfidence of victory in Korea, that Communists won't start a new crisis elsewhere, that we already are strong enough militarily.

Overconfidence is strongest in Congress, but Congress largely reflects sentiments of voters. And extremely vociferous voters — from labor, business, agriculture—keep telling Congress to go slow on mobilization.

• • •

Lack of leadership is hurting, too. At the White House mobilization still rates as the most urgent job facing the nation. But nothing much is being done about it because Truman staffers are too busy counter-punching at the scandal investigators.

Poor administration support of moblizer Wilson is the result. Example: one day Wilson calls for heavy taxes to put the brakes on inflation; a few hours later Treasury Secretary Snyder is telling Congress we need only $10 billion in new taxes this year, instead of the $16.5 billion President Truman asked in January.

• • •

Overconfidence really is just wishful thinking. No one knows what the Communists are up to. But official efforts to put the urgency back in the emergency have been ineffectual.

No one heeded Defense Secretary Marshall's warning that the international situation is critical. And Speaker Rayburn made no more impression with his hints of a new Korean crisis. Cynics in Congress labeled both as propaganda.

Net effect of all this is to postpone any tough controls. No one even tries to make labor accept real wage and manpower controls. Price ceilings are a joke without curbs on farm products —and Congress won't change the law to permit that.

Even materials controls show signs of crumbling. Anyone who is hurt by them can complain to Congress with good chances of getting relief. That's what happened to the ban on aluminum for consumer goods. Congress pressured the controllers into postponing it from April 1 to May 1.

• • •

Mobilizer Wilson has had to trim his sails to withstand blasts from Congress. Most of his powers will expire with the Defense Production Act on July 1, unless Congress renews them. It's a club Congressmen never fail to wave over the heads of the mobilizers when they want changes in controls.

But Wilson must get tough on controls—and soon. Any housewife can prove to you that inflation is getting out of hand. And the materials situation calls for drastic cuts in non-defense production.

You can see that in Wilson's estimates of military demands. Right now they're taking only about 8% of gross national product. By year's end the defense bite will be up to 15%, next year to 20%. And a long list of raw materials already are almost impossible to get.

That's why Wilson decided for CMP starting July 1. Even the military is having trouble getting deliveries because of scarce materials.

• • •

There's no safe alternative to tough controls. It's either go ahead with plans to cut civilian use of materials needed for defense or cut back delivery dates for military contracts now being let. And Wilson says the present rate of arms buildup will not make the U. S. even reasonably safe until 1953.

• • •

Here's the outlook on manpower controls, now that Wilson's manpower organization is set:

No controls are yet in sight. When they come, they will be voluntary as in World War II. That is, with labor and management agreement on them.

Overtime pay after 40 hours a week will stay.

Another FEPC is doubtful. Defense contracts have anti-discrimination clauses anyhow.

• • •

Wilson has two manpower committees—The Interagency Policy Committee and a labor-management group. Some problems they will get into:

Skilled workers—How to share them fairly with the military; the federal government's role in training.

Pension rights—How to protect a worker's pension equity when he moves to a defense job. Idea: re-employment rights in his old job.

Wage equity—How to assure manpower for an important defense plant when its wages are below those of a competitor across the street and can't be raised because of wage controls.

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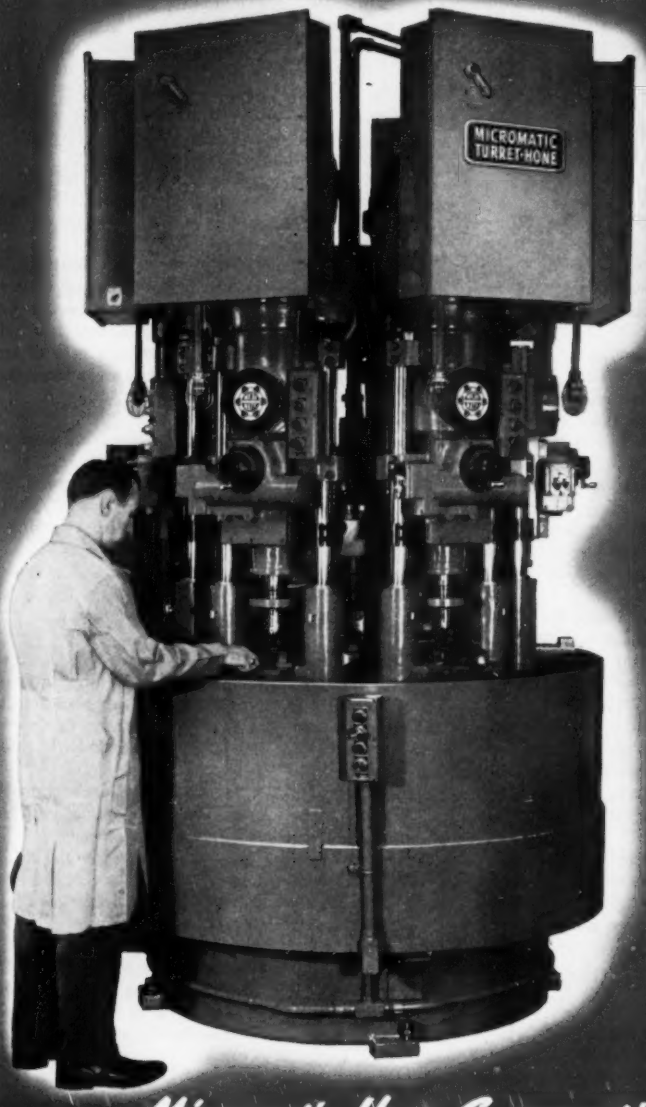
More cargo ships are coming out of mothballs. The Maritime Commission is bringing them back at a rate of 45 per month. With Korean shipping needs now in hand, newly reactivated ships will carry ECA cargoes to Europe, return with metallic ores.

• • •

U. S. is out of the world tin market until prices go down. Decision was made after meeting with principal tin producers. We're gambling that our stock will hold out until the price drops to $1.03 per lb.

NEW *High Production * High Precision* TURRET • HONE



SIX MICROHONING UNITS
One Machine
One Operator

THIS new model 736-6 TURRET-HONE finishes a part every five seconds. The operator unloads and loads the fixtures as they pass the control station. As the loaded fixture leaves the control station it automatically lifts into position, the tool starts rotating, reciprocating and expanding. The machine rotates continuously. When the part is "to size" the automatic MICRO-SIZE control stops the tool and drops the fixture. As the fixture passes the operator again, a new part is loaded and the cycle continues. This is repeated on each unit.

Micromatic Hone Corporation 8100 SCHOOLCRAFT AVENUE DETROIT 4, MICHIGAN

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55 George St., Brantford, Ontario, Canada • Micromold Manufacturing Div., Boston Post Road, Guilford, Connecticut

Detroit

Automobile output is on its way down. It has held on the highest plateau in history for almost a year, but the end is in sight. The cause: Government restrictions on use of steel, rubber, etc., in the second quarter.

The first fruit of those curtailment orders came in elimination of spare tires effective April 1, an action taken by practically all companies. Four tires will equip about as many cars as did five tires before—and the cutback order will have been complied with.

There's no such easy solution in sight for steel use reduction. But auto men think that in spite of everything they'll get along better than most people expect. But schedule cutbacks began in many plants when the turn was made into April.

In any case, they have a good first quarter to look back on. Production in recent weeks has been running at a rate around 175,000 cars and trucks per week. It won't immediately fall off very much from that level, barring unforeseen contingencies—by which, at this writing, is meant possible strikes.

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Labor relations people are frankly worried lest the difficulties in Washington over creation of a Wage Stabilization Board policy erupt in "notice serving" strikes around the country—tieups which would serve to emphasize labor's impatience with developments. The auto industry, however, seems to be in about the best position of any industry on this score, due to its long-term escalator-base pay agreements.

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With regard to current problems on materials, it's doubly interesting to take a look at the long-range dreams of the automobile engineers, exemplified in the development of the latest General Motors car of the future, Buick's XP-300. Pistons, cylinder head and block of its 300-hp V-8 engine are cast from aluminum alloy; intake valves are nickel chrome; valve seats are stainless steel; valve guides are high tensile bronze; cylinder barrels are of special alloy cast iron. Aluminum and magnesium are used extensively elsewhere on frame and body.

The scarcity of these metals, together with that of high premium gasolines and methyl alcohol—the engine's dual fuel supply—are two further good reasons why Buick is making no commitments about building a counterpart for mass marketing anywhere in the foreseeable future. XP-300 is classed strictly as experimental—a "laboratory on wheels."

Automatic drive popularity note: Since General Motors first introduced Hydra-Matic Drive on Oldsmobile 11 years ago, over 3,500,000 GM cars have been sold with automatic drive of some sort. A still heavier swing toward shift elimination is indicated: Last year 94% of Oldsmobiles sold had Hydra-Matics; over 97% of Cadillacs had the same; about 65% of Pontiacs since 1948 have accelerated with it; 77% of Buicks drove with Dynaflows last year; and the latest, Chevrolet's Powerglide, has never found production facilities sufficient to keep up with demand.

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The tank family is growing. The parent vehicle of the light tank group, manufactured by Cadillac at Cleveland (the first tank was completed March 27, three months ahead of schedule), now has five cousins.

Cadillac itself will manufacture an anti-aircraft gun mount carrying twin 40 mm Bofors guns. International Harvester engineered an armored personnel carrier, to be built also by Food Machinery & Chemical Corp., San Jose, Calif. A tractor, engineered by the Detroit Arsenal, will be built by Allis-Chalmers. Two artillery mounts, one carrying a 105 mm howitzer, the other a 155 mm howitzer, will be built by American Car & Foundry.

• • •

Some relevant figures on the Cadillac operations: Some 14,000 machine tool and equipment orders have already been released by an engineering department of 451 men, a third of them from GM divisions. Tooling is perhaps half completed up to now, maybe a little more. Some additional tooling, and a fewer number of machine tools, will be required when the anti-aircraft job gets into production late this year. An estimated 800 machine tools were obtained from government reserves.

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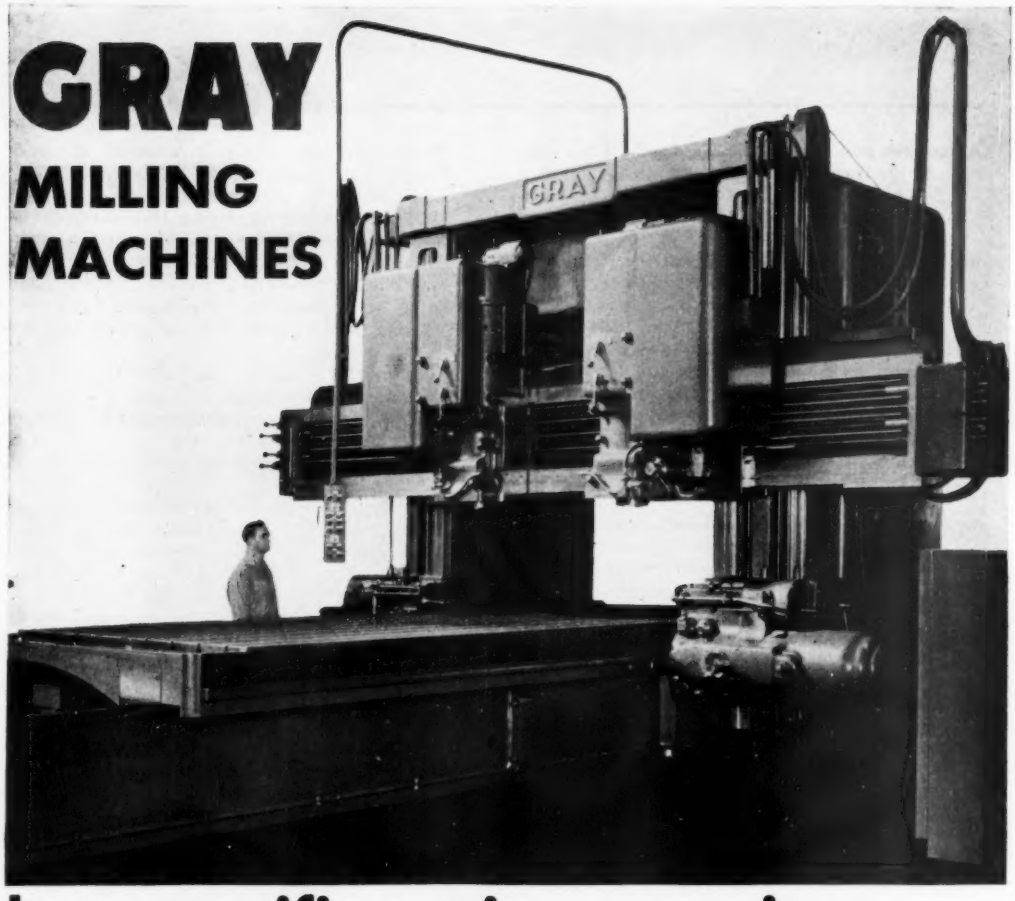
Ford will begin to release tooling shortly on its tank contract. The tanks will be produced in a new plant to be built at Livonia, Mich., just west of Detroit. The contract calls for facilities and deliveries of approximately $195,000,000.

• • •

Detroit has been called a Number One atomic attack target. To date, no major firms have been seen stumbling to get out of the area. Rather most would seem inclined to follow Ford Motor Company's example: You may be unable to leave, but you can prepare for disaster.

Ford appointed a Security Committee of top-level management members to draw up a program for minimizing loss to people and plant in event of attack from without. Protection against attack from within Ford—i.e., against sabotage and espionage—is already well along in organization and implementation.

GRAY MILLING MACHINES



have terrific cutting capacity—
yet simplicity of control

Two 40 H.P. heads and two 20 H.P. heads, i.e. 120 H.P., instantly available to rip off metal at the proper speed for each cutter.

Terrific cutting capacity so simply and easily controlled that the operator maintains maximum production with minimum fatigue and strain.

Power, accuracy and simplicity of operation are dominant characteristics of all GRAY Milling Machines. Let us tell you about them. Write for circular.

The G.A. GRAY Company

planers • milling planers
planer type milling machines
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Machine Tools

Washington has not yet decided whether to issue a special price order covering machine tools and presses. Facts and figures were presented to price stabilization officials last week to support the contention that machine tools and presses should have special treatment.

The machine tool industry has compiled data from a number of companies with good cost-accounting systems to find out how much production costs have gone up since Korea. These data have gone into a report which has been submitted to Washington.

• • •

While defense production officials are exhorting the industry to turn out more machines faster, price authorities are advising against subcontracting because it will mean increased costs. These authorities also are refusing to allow overtime in figuring added costs.

If a special order is not issued for machine tools and presses, the machine tool industry will be subject to a General Machinery Order which may be out by the time you read this page.

Pool orders for machine tools totaling close to $100 million have been sent by GSA to a group of builders (list on page 184).

But no further pool orders will be issued until GSA gets funds beyond the original $100 million, which came out of the President's emergency fund. When that will be is anybody's guess.

The funds will be provided in the supplemental appropriation bill now in Congress.

• • •

A new wave of orders for British rearmament program has struck machine tool builders. A total of nine lists of machines which the British want from this country has arrived from London.

These lists add up to about 8200 tools. The British do not yet have firm quotations on 3500 of them. Altogether, it is believed that British orders placed with the U.S. machine tool industry will run up to $150 million. At this writing, builders have on their books some $85 million.

• • •

More than 4600 machines earmarked for the British have been tagged with DO's. The remainder will be rated before long.

The DO's for the British fall within the 30% classification under the priority system set up by NPA's Order M-41. That takes them out of the 70% classification in which they would have to compete with the U.S. armed services for preference. Point is that they will be at the top of the 30% bracket.

Result is that British should fare very well on deliveries, except in certain categories in which machines are highly critical to our own defense effort (such as boring mills).

There may be only enough boring mills built for awhile to meet requirements of the services here under their 70% allotment. If so, the British will be out of luck.

• • •

Delivery schedules for the British line up roughly like this: the British hope to have 12% or more of their U.S. machines shipped to them by the end of June; another 5% in the third quarter; 5% more in the fourth quarter; 10% in first quarter of 1952; possibly 15% in second quarter of next year.

Ultimate aim is to get deliveries of all machines from U.S. for current program by December, 1952.

• • •

British have expanded sharply their machine tool purchases at home and in Europe. Between February 3 and March 15 the Ministry of Supply ordered 4000 machines from British builders, raising the orders on hand to 9000 in Britain's own machine tool industry.

Around 4500 machines are being secured from various European sources—Germany, Italy, France, Belgium, Sweden. Western Germany has biggest single chunk of that business.

Though the British program is so large as to overshadow that of any other Atlantic Pact nation, France has ordered $4 million and Netherlands $3 million of U.S. machine tools.

Defense production plans of France and Italy have not shaped up completely, hence tooling needs are not known. These plans, in fact, are being made so late that both of these countries probably will have to rely upon their own machine tool industries and the industries of nearby nations for their retooling requirements. Very little will come from U.S. builders.

• • •

At least one prominent machine tool builder has rejected a pool order from Washington for two reasons: (1) it is not satisfied with price terms; and (2) it is not willing to accept 82½% of the established price for machines which would go into storage.

• • •

Machine tool orders still are pouring into builders' shops at a terrific rate. Lately bookings have been on an annual basis of $2 billion. Meanwhile production is not increasing as it should. Shops are losing skilled men to other industries, materials and parts are hard to get, and Washington's price policies are not conducive to farming out work and adding hours. However, most builders are running two shifts on a 48 to 54 hr. basis.

Hydraulic equipment, motors, bearings and castings are among items which builders are having trouble getting.

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These 35-mm silent slide films (not motion pictures) are invaluable for plant training—refreshing older workers, instructing newcomers—to help them get the most from carbide tools. Films cover the material included in the Carboloy Tool Manual in easy-to-grasp, visual form. Available to you at approximate print cost. Free film catalog on request.

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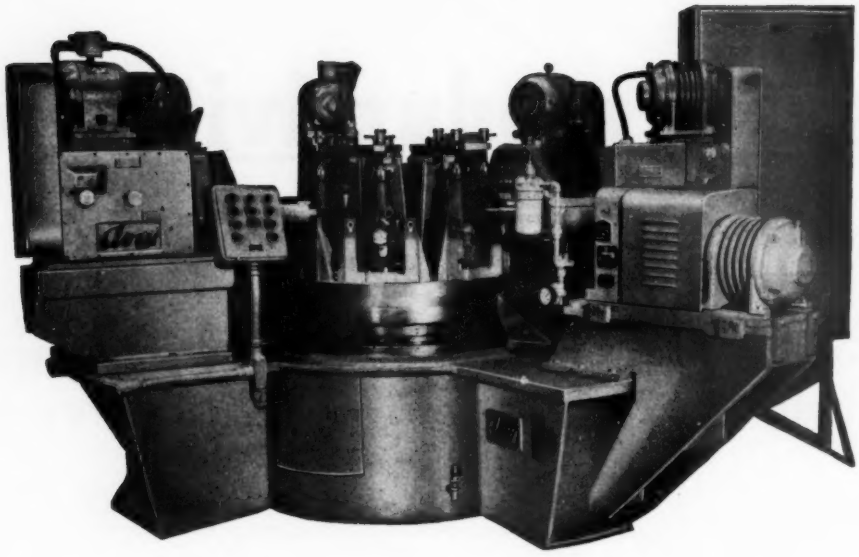
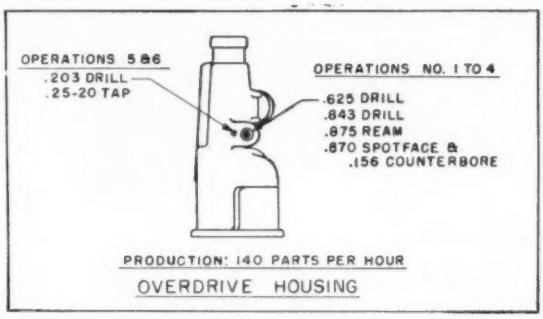


Avey AUTOMATIC INDEXING MACHINE



Part—Automotive Overdrive Housing.
Material—Cast Iron.

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Consists of five (5) No. 2 *Avey* Cam Feed Units and one Lead Screw Tapping Unit mounted horizontally on a well ribbed steel fabricated base around one 36", 7 station Automatic Index Table. The Cam Feed Units are all combined to operate simultaneously. The Automatic Index Table is operated by a brake motor. After indexing all units advance and perform various operations (see sketch). Machine operated by remote control with signal lights, jogging and cycle failure provided for each unit.

Replace your obsolete Drilling and Tapping Equipment with **Avey** Special Machines. Write *today!*

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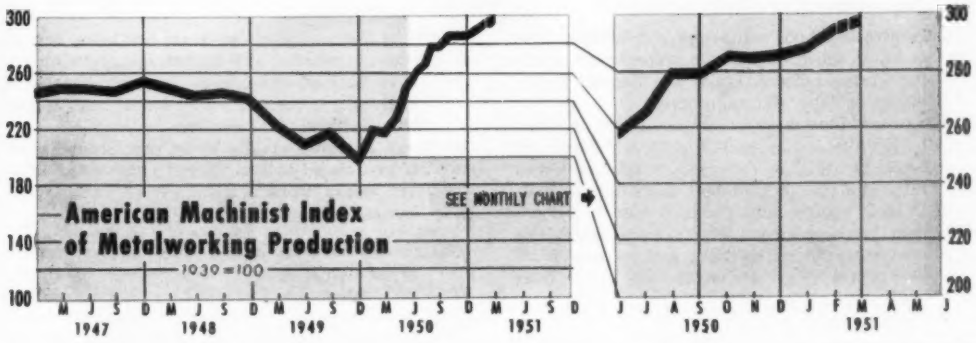
Gaging Metalworking



Industry Begins to Feel Defense Impact

Here's a quick look at various segments of metalworking: appliance output is still ahead of first quarter of 1950, but is below last year's rate.

Housing starts have fallen off. And that suggests a drop in future orders for boilers, heaters, ranges, refrigerators, washers.

New construction put in place during first quarter is put at $6.2 billion, biggest first quarter in history and 21% above last year.

Freight car production should hit 9000-a-month level this month or next. This will be a sharp step-up from 6500 in March.

• • •

Farm implement people have been hurt by materials shortages. International Harvester is making stiff cuts in production of three tractor models and 16 major farm implements. Other manufacturers are in the same fix.

International Harvester has slashed second quarter assemblies of civilian motor trucks by 10,500 units and of refrigerators by 31,552 units.

Slow to feel effects of rearmament program, drop forging industry is finally getting the impact. Backlogs have been built up quickly to five months. Average weight of drop forgings has risen 15% in past year and is edging higher constantly as defense work grows.

Forge shops thus far have been able to get enough carbon steel bars to keep going full tilt. But they may be forced to curtail within 30 days.

• • •

Steel warehouses expect to have more steel as result of NPA order which directed mills to ship them 85% of carbon-steel tonnage they got in first half of 1950.

Warehouse inventories just now are virtually non-existent. Most of steel on hand is of seldom-called-for items.

This doesn't mean that mills are not making deliveries to jobbers. Steel is delivered to users the minute it arrives. It is not even unloaded at the warehouse in some cases.

• • •

Typical of today's metalworking situation is a report from Cleveland. Some 40 companies say that they will add workers this month. Manpower is of greater concern than materials. Two stamping firms have laid off men, who promptly got good jobs across the street.

Third quarter is causing little worry, because managements feel that by then (1) defense production will get going, (2) sufficient stocks of scarce materials will be so channeled that production of civilian goods can continue at moderate rate.

AMERICAN MACHINIST Index continues to climb. It is estimated at 297 in March (with 1939 as 100), a gain of nine points since January. The two components which have scored spectacular gains over a year ago are "Machinery" and "Transportation Equipment."

INDEX	MAR. '51	FEB. '51(p)	JAN. '51(r)	MAR. '50
	297*	**294**	**288**	**220**
Machinery		**292**	**285**	**213**
Electrical Manufacturing		**328**	**327**	**258**
Automobiles, Trucks		**241**	**241**	**195**
Transportation Equipment		**339**	**313**	**210**
Other Metalworking		**306**	**300**	**242**

AMERICAN MACHINIST'S INDEX OF METALWORKING PRODUCTION is based on manhours worked in the five components above.

* Estimated (p) Preliminary (r) Revised

Gaging Business

Place contracts where manpower is available. That is latest edict of Defense Department to its purchasing officers. Labor Department is advising on labor-shortage areas.

Bidding for skilled workers has intensified in many parts of the nation, including New York, where labor pirating is charged. Small machinery firms say that on pay days large defense contractors are recruiting skilled men in saloons near machine shops. What's more, interviews are being offered at night and on week-ends in obvious effort to wean men away from present jobs.

• • •

Average pay check of 13 million factory workers in February was $64.08. That was 12% more than a year ago. Increased wage rates before the government's stabilization order are responsible for the gain.

The military will absorb about 15% of the gross national product by the end of 1951, Mobilization Chief Charles E. Wilson says. The ratio will rise to a peak of 20% in 1952. Last year it was only 8%.

• • •

Believe it or not, a federal surplus looms for fiscal 1951, ending next June 30. That's why Secretary Snyder doesn't want a $16-billion tax boost any more—only $10 billion.

Congress may slash the increase further when it gets around to cutting the budget down to size.

Consumer debt for installment buying was off in February for second straight month. Credit extended in home appliances and furniture has been shrinking since federal controls were tightened last October.

Effects of the armament program are being felt in the contract tool and die industry. New orders have been almost one-third ahead of those a year ago, according to National Tool & Die Manufacturers Association.

Backlogs, as result of pile-up of new orders, have forged ahead to the highest point since 1946. Ten weeks' work is now on hand, and amount is steadily growing.

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The gearing industry is still showing gains month by month. February orders were up almost 6% compared with January, and it is believed that March went ahead of February. Index figure for February was 809.1, with 1935-39 taken as 100.

• • •

New orders for screw machine products went up in February, according to reports to National Screw Machine Products Association. The index touched 547, with 1940 as the base. January stood at 528. Shipments during February totaled 353 on the index.

• • •

California metalworking firms expect business in the second quarter to stay at the high level of the first quarter. In fact, most manufacturers feel that the trend will be up. A poll taken by California Manufacturers' Association reveals that 86% of those surveyed think that small companies will be able to weather handicaps of materials curtailments, credit and other controls.

• • •

Boeing Airplane Co. will spend $5.5 million for new machinery and equipment at its Seattle and Renton, Wash., plants, in addition to orders totaling $4.5 million already placed.

WEEKLY BUSINESS INDICATORS

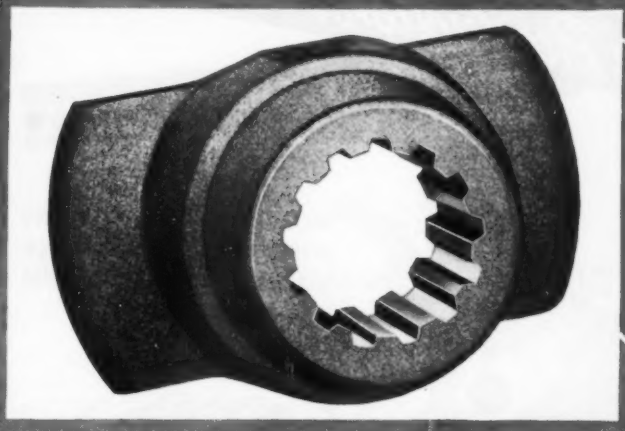
	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1923-1925 = 100)*	235.8	234.0	203.3
Steel ingot production (thousand tons)	2,047	2,069	1,845
Electric power output (million kilowatt hours)	6,767	6,848	5,912
Production of automobiles and trucks	181,769	174,674	139,821
Engineering Construction awards. (Eng. News-Record, millions)	$236.8	$414.9	$304.4

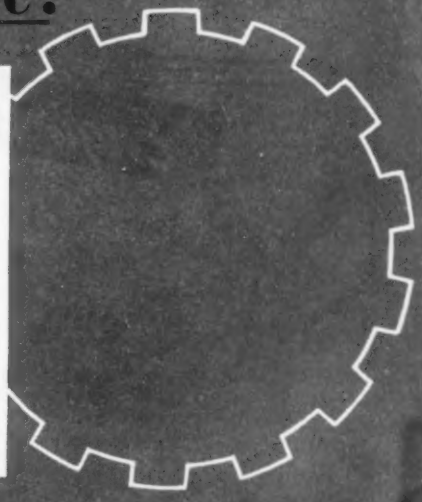
MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators, domestic sales (thousands of units)	324	489	461
Vacuum cleaners sales (thousands of units)	287	282	264
Washers sales (thousands of units)	341	321	343
Household electric ranges sales (thousands of units)	124	132	118
Television receivers production (thousands of units)	775[1]	646	480
Radio receivers AM and AM-FM production (thousands of units)	1,543[1]	1,202	1,059
Gear sales index (1935-1939 = 100)	809.1	764.6	272.9
Foundry equipment new orders index (shipments 1937-1939 = 100)	638.6	668.0	113.1

* Seasonally adjusted. [1] Estimated.

Lower Cost-per-piece:





BROACH REDESIGN *cuts tool costs—boosts life*

SAVES $450.00 MONTHLY

Redesign of the tools for this spline broaching operation resulted in a 24% reduction in original tool cost, 22% increase in the number of sharpenings per tool as well as a 14% increase in the parts produced per sharpening. The result in terms of cost-per-piece was a net saving of $450.00 per month.

Slight savings in production and sharpening time were effected due to the fact that this redesigned tool was shorter than the original. However, in many cases lowest cost per piece can be achieved only through redesign which increases tool length . . . a decision which is best made for each application by qualified broach specialists.

This spline operation is but one typical example of how Detroit Broach specialization in broaches and broaching tools pays off. Such specialization provides a back-log of experience which is unparalleled as the basis for sound recommendations. Whether you are considering conversion to broaching or more for your money on present broaching operations, don't fail to consult Detroit Broach. We will be very happy to supply actual cost and production data.

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by

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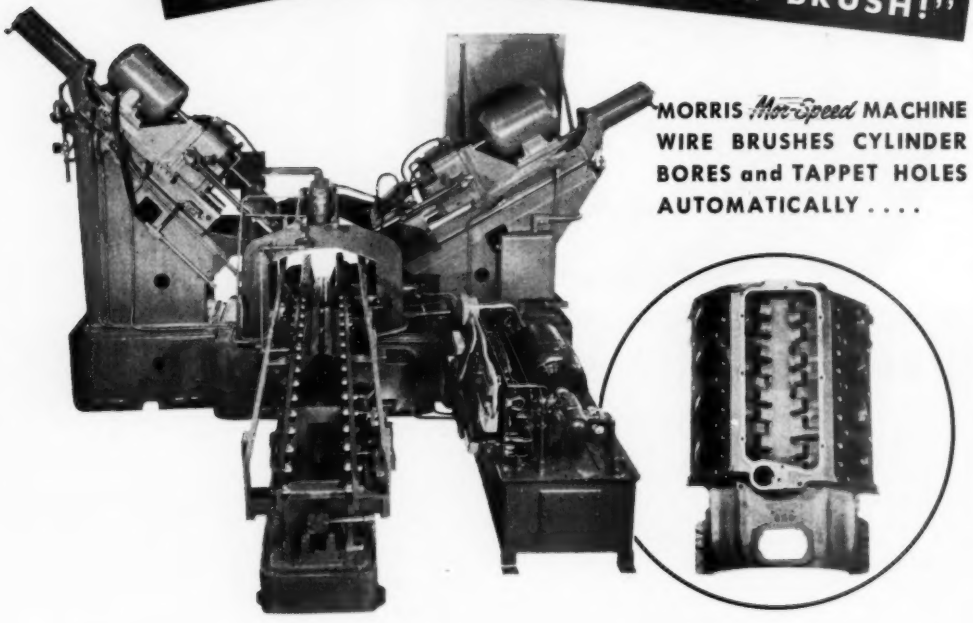
Engine Production Problem "GETS THE BRUSH!"



MORRIS *Mor-Speed* MACHINE WIRE BRUSHES CYLINDER BORES and TAPPET HOLES AUTOMATICALLY . . . .

"Untouched by human hands," this massive V-8 engine block is automatically loaded, clamped, wire brushed on both banks, then automatically unloaded to the production conveyor.

Installed in the plant of a leading auto manufacturer, this Morris Production Machine speeds the production of a new super-powered engine. In the view shown here, the left hand hydraulically operated angular slide carries four wire brushes for the cylinder bores. The other angular slide carries eight brushes for the tappet holes. Automatic 180° indexing allows alternate brushing of both cylinder banks.

This machine illustrates the versatility of Morris Engineers in applying production methods to time and labor consuming jobs. If your work requires numerous operations on a mass production basis, your inquiry is invited. No obligation.

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American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

What Mechanical Handling Will Do For You

"Better materials handling offers a greater opportunity to cut production costs and to increase productivity than any other single factor."

That was the forthright declaration of a team of British experts, after having visited many American plants less than a year ago. The team was sponsored by the Anglo-American Council on Productivity.

"A steady, uninterrupted flow of materials to and from each workman," the team reported, "will raise productivity at least 15%."

THERE IS NO MYSTERY about how mechanical handling has increased U. S. manufacturing efficiency. It has come mainly from an extensive and intensive application of known methods and equipment available to all metalworking concerns.

The advantages of improved materials-handling techniques are tangible. The British team named some of them:

(1) substantial saving in skilled labor; (2) more consistent level of productivity because of less fatigue of operators; (3) reduced cost of indirect labor; (4) greater use of existing productive facilities and buildings; (5) less work in process; (6) increased turnover and better inventory control; and (7) better outlook of workers as a result of operating mechanized equipment instead of doing manual labor.

YOU DON'T HAVE TO SPEND a lot of money for a new plant in order to make impressive savings in materials-handling costs. The British pointed to a U. S. company with a two-story factory which has doubled its output without adding to floor space. The reason is that it has made full use of air space by installing overhead conveyors and employing fork-lift trucks.

You don't have to buy new production equipment to get satisfactory results from mechanizing your handling of materials. You can apply simple devices which will do a good job for you.

Full rewards from better materials handling will not stem from a one-shot action. Handling methods should be continuously studied. You should ask habitually, "How did this material get to this machine? How and where does it go next?" You should ask *why* at each manufacturing stage.

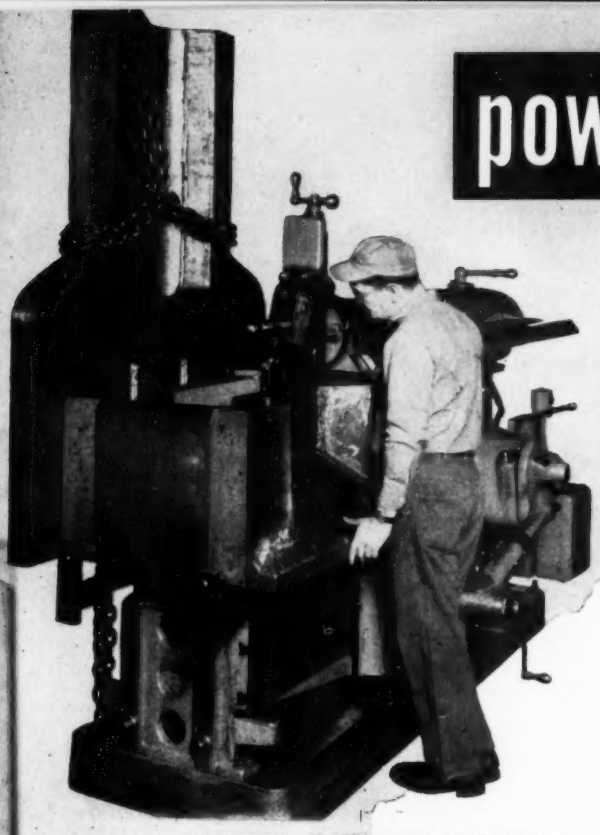
WITH WAGES still headed upward despite Washington's efforts to freeze them, with the pinch on to keep prices from going higher, wise metalworking management will take a new look at what mechanical handling can do to cut costs. What a field for savings, in small as well as medium sized and large plants!

We quote the enthusiastic remarks of one U. S. manufacturer to the British:

"Our management and labor have united as one hard-hitting team to replace the man-killing pushing, pulling and lifting of materials with mechanization that means higher wages, better working conditions, increased productivity, and lower costs."

Burnham Finney

powerful!



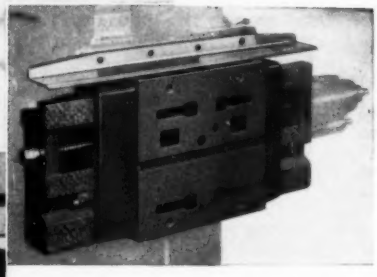
Jobs like this 5300# weldment are easy on a Cincinnati

Cincinnati Shapers are powerful and dependable...

Cincinnati Shapers handle very heavy work—are powerful metal removers. They are dependable and trouble free on the most demanding jobs.

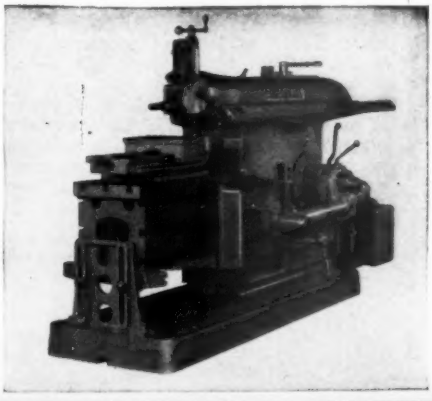
The extra long feed of the Cincinnati tool slide gives the needed range to shape the long blind hole of this large weldment. Dovetailed tool slide and accurately gibbed ram, with extended bearings, prevent chatter under these severe conditions. Table feed and power rapid traverse operate smoothly even with this 5300-lb. load.

Cincinnati Shapers work to close limits and are profitable in both tool room and production departments.



This massive cross rail securely supports the apron on three automatically lubricated bearing surfaces. All controls are at the operator's position. The cross rail is square-locked to the column and automatically lubricated. Alignment is maintained by taper gibs.

This sturdy table support has the sliding action at the table and is gibbed to maintain alignment. Sliding surfaces are completely protected against dirt.



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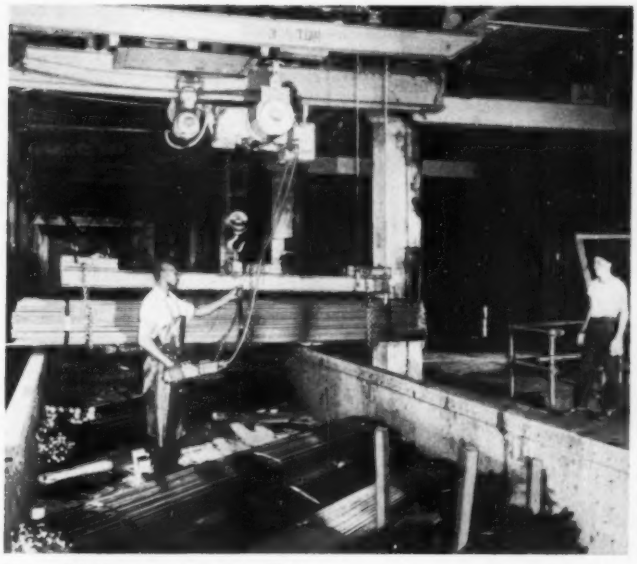


Monorail bridge crane removes mill bundles of bar and rod stock from railroad car and highway truck. Crane, with 3½-ton electric hoist, moves bundles weighing approximately 6000 lb. Hoist transfers to track over opening to basement

MECHANICAL HANDS CARRY BARS FOR 33% LESS

By replacing man-handling with machine-handling, two men now take care of all incoming stock for automatics consuming more than 30 tons of steel per shift

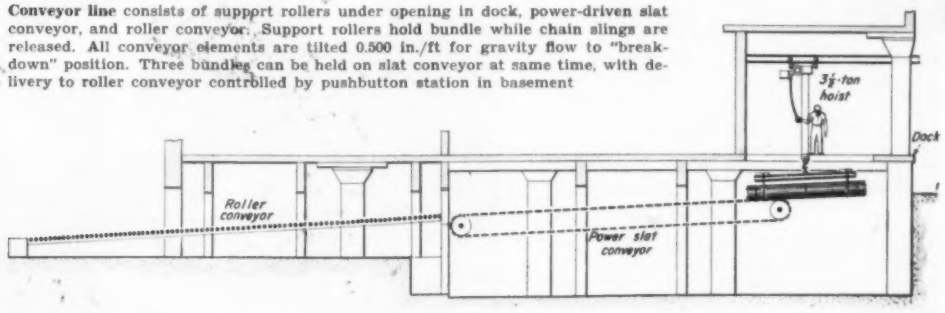
BY BEN C. BROSHEER
Associate Editor

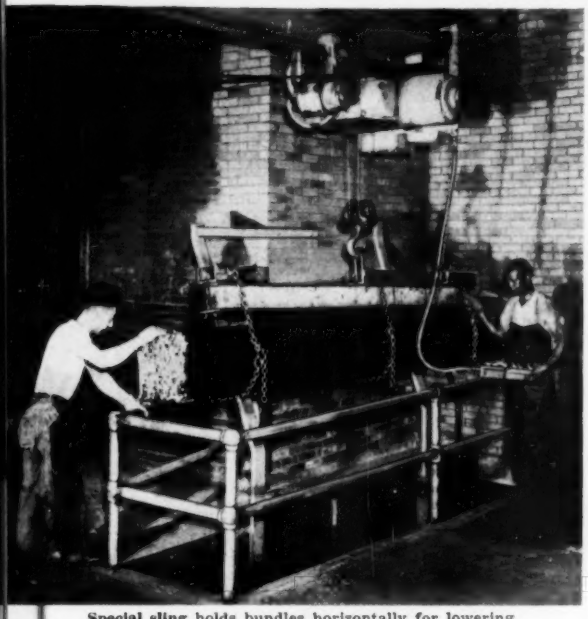
HANDLING COSTS on bar stock have been cut more than 33% at the Chicago plant of Stewart-Warner Corporation. Installation of mechanical handling equipment has made these savings possible through reduction in demurrage charges and the elimination of many operations formerly performed by hand.

Only a few months ago, mill bundles of bar stock, weighing approximately 4,000 lb, were broken open at the receiving dock, after removal from truck or railroad gondola car, and loaded by hand onto four-wheel stake carts. About 1,500 to 2,000 lb could be handled at a time. It required two men to push each cart across the plant to an elevator, where it was lowered into the basement, then moved to the storage area for unloading into racks.

Today, 6,000-lb mill bundles are removed from truck or gondola by overhead hoist and lowered, through an opening in the receiving dock floor, directly onto a conveyor in the basement. The conveyor, which is a combination power-driven

Conveyor line consists of support rollers under opening in dock, power-driven slat conveyor, and roller conveyor. Support rollers hold bundle while chain slings are released. All conveyor elements are tilted 0.500 in./ft for gravity flow to "breakdown" position. Three bundles can be held on slat conveyor at same time, with delivery to roller conveyor controlled by pushbutton station in basement





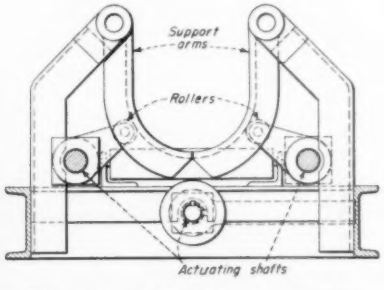
Special sling holds bundles horizontally for lowering onto conveyor in basement. Chains can be released from floor level with long hooked rod

slat and roller line, delivers bundles to a break-up bench where rods and bars are dropped into a bundling fixture on a scale. This fixture holds 12- to 15-ft bars until a shop bundle of 2,000 lb has been accumulated. Three steel straps then are placed around the bundle to hold it for storage.

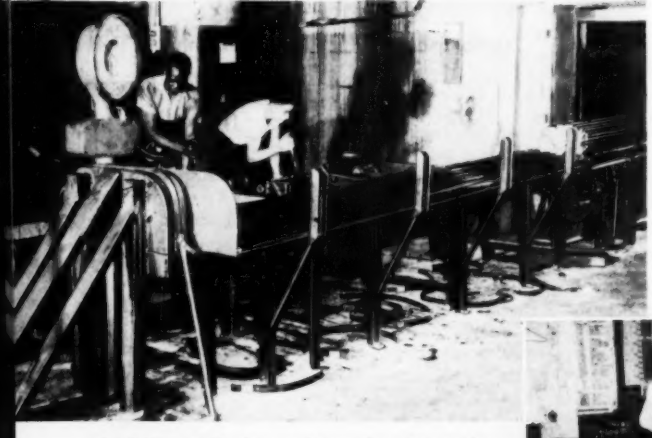
While a bundle is accumulated in the fixture, the previously strapped bundle is carried by monorail hoist to stacking racks for storage until needed by the machine shop. Two men now take care of all incoming bar and rod stock, and the fatigue of pushing hand carts across shop floors has been eliminated.

Most of the bar and rod stock handled in this department is steel, as Stewart-Warner's automatic screw machine department uses about 30 tons of steel bar stock each 8-hr shift. Bundles and boxes of nonferrous bars and rods are handled by the same hoist and conveyor system, but are moved by hand into bins. This is because only small quantities of these materials are stored at any one time.

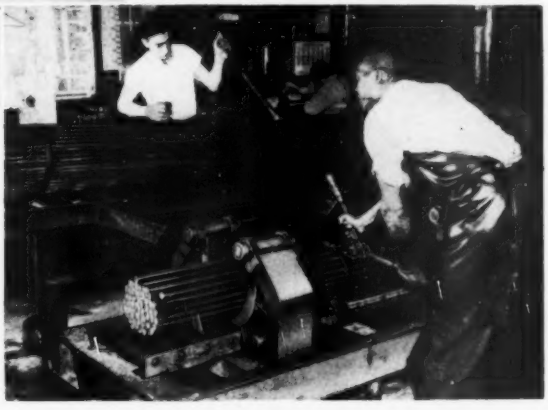
In addition to elimination of the hard physical labor previously required of stock handlers, the mechanical handling devices now employed have practically ended demurrage charges. In the past, this has been an important element in the cost of handling bars and rods.



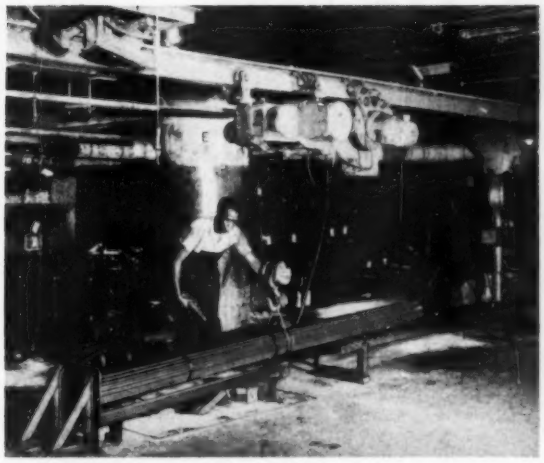
Fixture arms hold bundle above conveyor until bundle is strapped. Lever opens arms to drop strapped bundle onto rollers for movement to holding station



Breakdown table has well-braced, rubber-and-wood cushioned stop to halt bundles moving freely down slanted roller conveyor. 6,000-lb bundles are broken into 2,000-lb bundles for easy handling and storage in basement racks. The two men who work at breakdown table and bundling fixture also unload bundles from cars and trucks at receiving dock upstairs

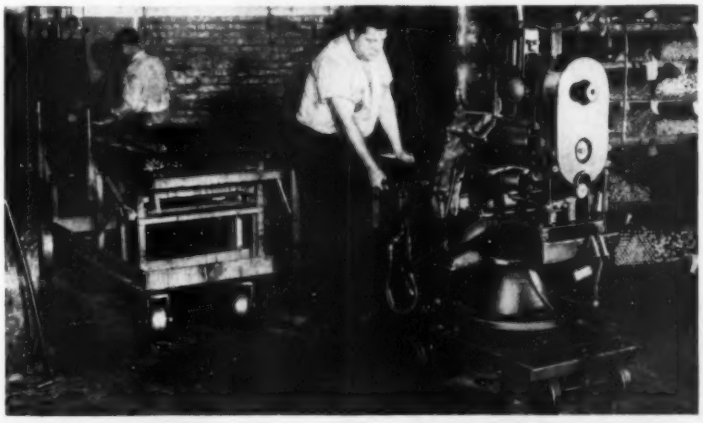


Bundling fixture is mounted on welded frame bolted to 6×8-ft. platform of Yale & Towne 2,500-lb capacity floor scale. While one worker (background) opens mill bundle, second man straps 2,000-lb shop bundle (foreground)

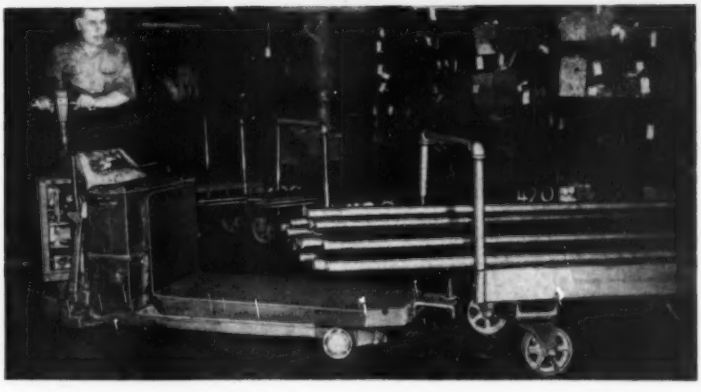


At holding station, Shepard-Niles electric hoist on Louden Moto-Veyor picks up bundles for transfer on monorail tracks to storage racks in basement area. Endless cable sling is left on bundle in storage rack so handling time is held to minimum

Storage racks in basement holds 1348 bundles with sections for various sizes of round, hex, and square bar. Monorail track system, with two hoists and floor-operated switches, serves all racks



Elevated platform cart supports stock during pointing. When bars must be pointed, bundles are opened and moved on platform carts to pointing group. Operator of second machine drops finished bar onto stake cart

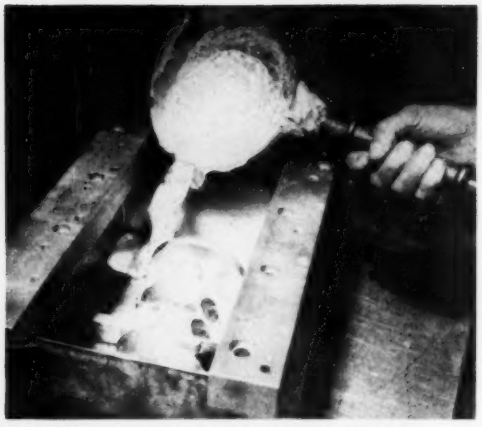


Power truck has bracket welded to end of platform to engage vertical rod welded to shop carts. Operator of Transporter raises lift platform to engage rod for power movement to machine shop

PAD YOUR TRIMMING DIES WITH ECONOMICAL ZINC

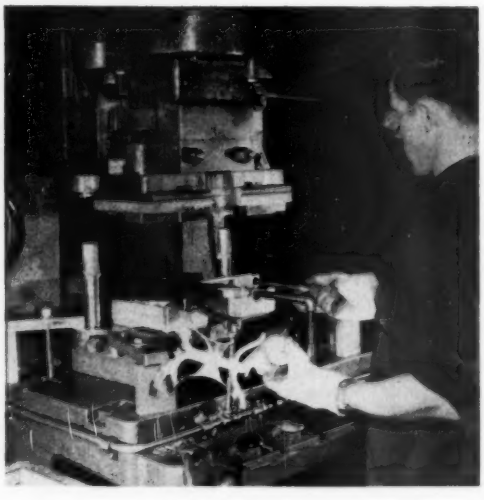
Six Minster open-back presses trim aluminum die castings at Alcoa's Chicago plant. To keep die-construction costs from going sky-high, zinc pads are cast around sample workpieces, then are installed around trimming dies to prevent the die castings from buckling when flash and runners are chopped off. Zinc pads are quickly made, operate serviceably, and are easily replaced

BY H. C. SLAGLE, Works Manager
ALUMINUM COMPANY OF AMERICA, CHICAGO



Pad-casting process starts with flat sheet of steel, sample die casting, and sheet form with weights. Zinc is poured at 300 F over casting to form exact pad shape

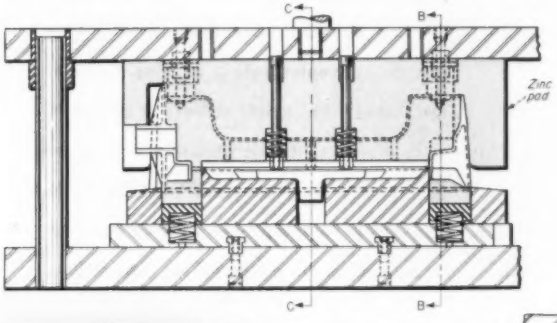
Finished pad nests in trimming die on press; holds motor-boat housing during down-stroke so 14 holes, flash, and runners can be sheared. Springs behind pad reduce shock of impact

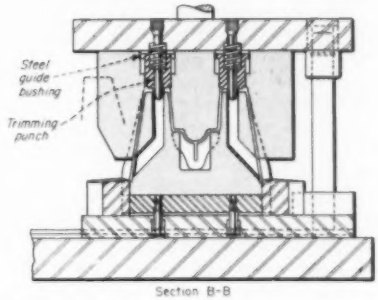


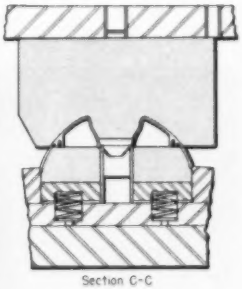
Aluminum head covers for gas-pressure regulators are typical small job that is trimmed in same fashion as larger die castings

Drainboard casting for washing machine is so big that die must be extended for loading and unloading. Cylinder retracts die into operating position for trimming stroke

Precision switch closes after die is back in position, allowing normal pushbutton operation of press. Cylinder is mounted inside press column to shift die on slide

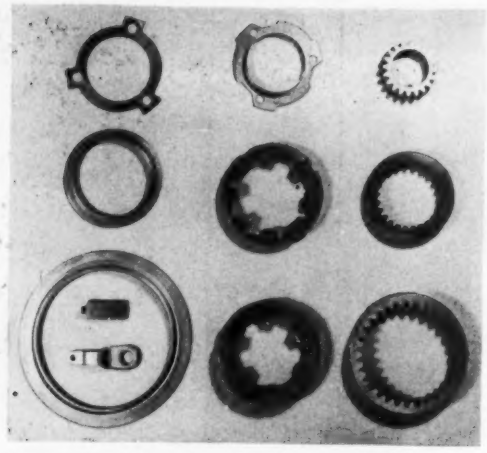






Zinc pressure pad, locating sections, and trimming die are nested together to form dieset. Cutting edges of die are hardened tool steel

Vacuum-cleaner housing is trimmed and has seven holes pierced with one press stroke. Housing fits over zinc pad, which guides inverted punches in dieset



Pump gears and over-running cams are included in these eleven typical transmission parts that are wet-tumbled to deburr edges and improve surface finish

HOW CHEVROLET DEBURRS POWERGLIDE PARTS

Close fits and good finish are mandatory for transmission parts; and while regular machining leaves burr-free edges on some components, others must undergo further finishing operations before they can be assembled into a housing. Chevrolet takes the most modern equipment, adds a new synthetic abrasive that gives top results, and plans good handling methods for economy of labor to drop costs on high-production wet-tumbling operations

TUMBLING TIME FOR POWERGLIDE PARTS

Part Name	Barrel Rpm	Pc per Barrel	Time Hr	Chip Weight
Front pump-driven gear	12	125	1.5	1400
Rear pump-drive gear	12	450	1.25	1400
Rear pump-driven gear	12	250	1.5	1400
Clutch-piston rear shell	20	750	3.0	1000
Clutch piston seal retainer	20	1000	3.0	1000
Valve thermo. retainer	20	1500	3.0	1000
Tur.-hub bolt lock	20	1500	5.0	1000
Clutch-spring retainer ring	20	750	3.0	1000
Manual valve in. lever	20	5000	5.0	1000
Torque-converter over-running cam	20	200	1.25	1000
Sec. stator over-running cam	20	200	1.25	1000
Front-pump drive gear	12	150	1.5	1400
Clutch-spring seat	20	1500	3.0	1000

Equipment is a row of six CW60 Roto-Finish steel barrels with synthetic - rubber linings. Each double compartment is 60 in. long, has a 36-in. OD

BY HERBERT CHASE

FOUR constant - speed, 20 - rpm double Roto-Finish barrels and two variable-speed barrels that usually run at 12 rpm are the capital equipment for the job. Three sizes of aluminum-oxide chips are available to be charged with the parts—the one picked each time is the smallest that will not jam inside recesses in the parts. A Roto-Finish compound is also added with water to prevent glazing of the chips, which would cut down on cutting action.

The charge for each kind of part must be worked out, considering the size of work, weight of chips, and amount of compound and water. Once tests have established the right proportion of materials to be charged, this is made standard. The accompanying chart illustrates typical charges.

After the parts and chips have been charged, 7 lb of compound is added to the barrel, and water is run in until it reaches 1 in. above the charge. Then, the doors are locked and the timed cycle—running from 1¼ to 5 hr—is started. Timing is longer for large burrs, shorter for small burrs and lighter parts.

After removing the charge from this barrel, the operator—who manages the whole row of six machines by himself—shifts the parts and chips to a screen separator that will drop the chips and hold the parts. Parts are transferred to metal baskets and dipped in soluble oil immediately. They are dipped again just before being dumped into tote pans for removal to another department. The chips, in the meantime, are moved back to the barrel location for recharging with a new parts batch.

Effects of the tumbling are to remove burrs, round parts edges slightly if desired and if the timing cycle if long enough, and to only scour the flat faces slightly. Dimensional changes are nil. Results have been so favorable that tests are being conducted on other parts to work out time cycles and charge proportions.

1 **Full load** of gears and abrasive chips is dumped from hopper into barrel compartment. Chips are Coruloy, a special form of aluminum oxide

2 **Dumping** after cycle is done into tray. Compartment and load are water-flushed with hose, then load is moved with hoist and crane to separator

3 **Chips** are separated from parts on shaker screen that passes chips, retains parts. Finished components are finally dipped into soluble oil

GOOD CARBURIZING PRACTICE

XII...How to Measure Case Depth

Control of the carburizing process involves many factors. Some of these were discussed in the previous installment. But hardness testing, determining the cost of alloy appurtenances and methods of measuring case depth on work samples or test pins are likewise important. This article concludes the series

BY T. A. FRISCHMAN, Chief Metallurgist, Axle Division, EATON MFG. CO.

HARDNESS testing is an important phase of carburizing control. Various types of hardness testers are employed throughout industry, but the one most often used for checking hardened carburized cases is the familiar Rockwell machine. By establishing hardness limits for the case and on occasion supplementing the hardness test with a file test, satisfactory results can be obtained without too much effort.

Tests can be made on each work piece or on samples representative of a lot. Frequency of hardness testing is a matter of choice and conditions. Obviously, the more precise the control throughout, the more uniform will be the hardness of the work. In this case, the need for testing every hardened piece is reduced.

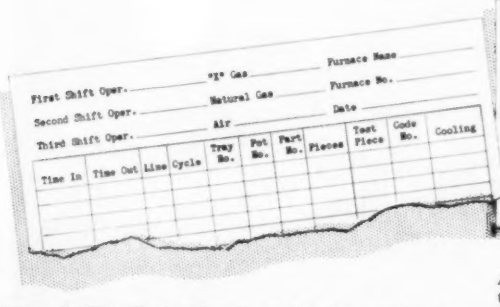
The importance of good control of copper plating for selective carburizing must be emphasized. Carburization and subsequent hardening in critical areas, where toughness only is desired, can result in serious consequences. If carburization on specified areas is not prevented, the part is often beyond repair and becomes scrap. If proprietary pastes or paints are used for stop-off purposes, every precaution such as proper cleaning, application and drying time should be observed.

Check Alloy Costs

From the cost standpoint, control of alloy furnace equipment is essential. Attention should be paid to the life of trays, carburizing containers, separators, work-holding fixtures, muffles, retorts, radiant tubes and related furnace parts. It is good practice to compile data on these items. Record the service life of individual items and which foundries or fabricating plants produce devices with minimum defects. Know the analysis best for certain furnace applications.

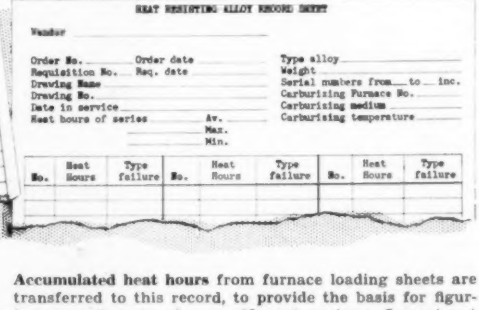
Routine checking of carburized parts is practiced to a considerable extent in well-managed heat-treat departments. Various parts are periodically sampled for a thorough check of case and core hardnesses, case depth, microstructure and fracture. If production parts are not too costly, they are picked at random for these checks; otherwise machine scrap serves the purpose. Much can be learned by this procedure. By following it regularly there is small chance that undesirable parts will get into service.

Case depth and case characteristics are related in respect to con-


First Shift Oper. _____ Furnace Name _____
Second Shift Oper. _____ Furnace No. _____
Third Shift Oper. _____ Date _____

Time In	Time Out	Line	Cycle	Tray No.	Pot No.	Part No.	Pieces	Test Piece	Code No.	Cooling

Furnace loading sheet makes it possible for operator to record each time a carburizing pot, tray, fixture, etc., of heat-resisting alloy makes a trip through furnace

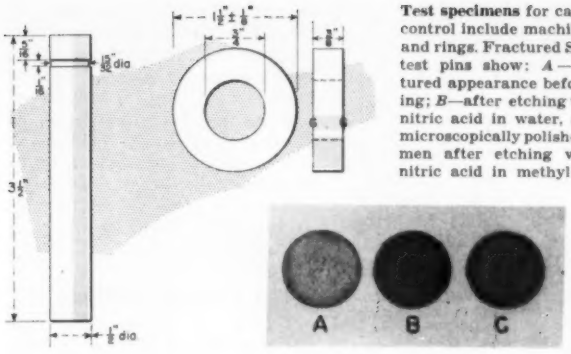

HEAT RESISTING ALLOY RECORD SHEET

Vendor _____

Order No. _____ Order date _____ Type alloy _____
Requisition No. _____ Req. date _____ Weight _____
Drawing Name _____ Serial numbers from ___ to ___ inc.
Drawing No. _____ Carburizing Furnace No. _____
Date in service _____ Carburizing medium _____
Heat hours of series _____ Av. _____ Carburizing temperature _____
Max. _____
Min. _____

No.	Heat Hours	Type failure	No.	Heat Hours	Type failure	No.	Heat Hours	Type failure

Accumulated heat hours from furnace loading sheets are transferred to this record, to provide the basis for figuring over-all costs of a specific pot or tray. Lowest net costs are thereby ascertained, regardless of original cost per pound of alloy or type of construction



Test specimens for case-depth control include machined pins and rings. Fractured SAE 4615 test pins show: *A*—as-fractured appearance before etching; *B*—after etching with 7% nitric acid in water, and *C*—microscopically polished specimen after etching with 5% nitric acid in methyl alcohol

trol. But it is possible to have correct case depth but not the desired microstructure. This divergence is the result of the interplay between several factors: carbon distribution, composition of the austenite at the time of quenching, decarburization, excess carbides, etc.

Several methods can be used for control of case depth. Their choice depends upon the extent to which control is carried out. The simplest and most universally used method is the test pin or test specimen. These items are used in various forms: ordinary spikes, heavy wire, rods, actual production parts, machined rings or centerless ground pins. Each shop has its own method of controlling case depth and, like everything else, some methods are better than others.

Test-Specimen Analysis

If care is taken to obtain test specimens of the same analysis and steel-mill practice as the workpieces, the chances are that the control will be much better. If both plain carbon and highly alloyed steels are being treated, sometimes an intermediate alloy steel can be used.

Some plants are fussy about purchase of test-pin stock. They will often request samples for comparative case-depth checking before buying the material.

To be of any value, the test piece must give a true indication, because the charge of work in the furnace represents a substantial sum. The best test pieces are surface ground before use to eliminate the possible misleading effects of scale and mill finish, which are otherwise likely to be present.

In a batch carburizing furnace, test pieces should be placed where they will show the minimum and maximum values for depth within the full charge. One piece may be placed in each pot if considered necessary, but general practice is to choose locations where the greatest differences in case depth usually appear.

In continuous furnaces, the problem of locating test pieces is not so acute; chances are better for greater uniformity in comparison with large batch furnaces. In fan-circulated furnaces, the test pieces are frequently placed throughout the charge; in salt-bath furnaces the pins are usually hung in the molten salt at any convenient place. In continuous gas-carburizing furnaces, locations of test pins are sometimes rotated between the different lines of travel and also between the rows or layers of work to give an over-all picture of the uniformity of case depth produced.

Case depth can also be controlled by carbon determination at successive depths throughout the case. This method is slow and laborious. So is the method of microexamination. Both methods are valuable, however, for determining the concentration and distribution of the carbon.

Measurement of case depth is a rather controversial subject. Several methods are currently employed. Each one has its share of adherents and opponents. The main obstacle is to obtain agreement on where the case actually ends. Prevailing concepts are: *effective depth*—the depth measured perpendicularly from the surface to a point where hardness is equivalent to Rockwell C50; *total depth*—from surface to a point where carbon enrichment ceases. However, the Rockwell C50 point is difficult to determine.

Case-Depth Measurement

For production measurement of case depth, the most common methods used are: (1) reading of fractured hardened case with a Brinell microscope, (2) the same as (1) but etching to reveal the case more clearly, (3) step grinding and determining Rockwell hardness at predetermined depths, (4) blueing of the fractured surface, (5) polishing and etching of a hardened fractured or cut surface and reading the depth with a Brinell microscope, (6) carbon-cut analyses, (7) microscopical examination, in either the hardened or slowly cooled condition, and (8) the martensite-start method.

In the foregoing methods of measurement, the difficulty is to find the fine point of demarcation between case and core, so that relatively good agreement can be obtained among various observers. In reading the depth of fractures, particularly unetched ones, considerable variation occurs, depending upon etchant used, time of etching, treatment prior to fracturing such as whether the test pin was direct quenched or reheated, and type of test-pin steel.

Provides Good Contrast

A production method to bring out sharp distinctions between case and core is to air cool the test pin from the carburizing temperature and quench in oil. This treatment refines the so-called effective case and leaves the core somewhat coarse-grained. Etching the fractured surface in a solution of 7% concentrated nitric acid in water produces good contrast between case and core.

An accompanying illustration shows the relative visibility of the effective case depth for a fractured test pin. At *A* is shown a specimen without etching. At *B* is seen the appearance of an SAE 4615 nickel-molybdenum test pin etched

in 7% nitric acid after air cooling from the carburizing temperature of 1700 F and oil quenching. Specimen *C* was treated the same as *B*, except it received a full microscopical polish and was etched with 5% nitric acid in methyl alcohol.

Other Methods

More specialized methods of hardness testing are also in use. They may require more technical skill than the customary fracture and etch method, and often require grinding and measuring equipment. Among these methods are:

1. By *step grinding*, hardness is measured at predetermined levels from the surface of the case.

2. The *taper grinding* method achieves the same result, because the angle is selected to permit readings at spaced increments corresponding to depth increments.

3. The *traverse method* is akin to the taper grinding method, but is done at an angle across a section through case and core.

Avoid Overheating

With these methods, there is always the possibility of overheating the case during grinding and thereby producing a loss in true hardness.

4. In the *bluing* method, samples are heated to 600 F, causing different colors to appear at various hardness levels. Exactness of temperature and also time at heat are important.

5. The *carbon-cut analysis* is the most positive means of determining the degree of carbon enrichment throughout the case as well as the total depth, because it involves chemical determinations.

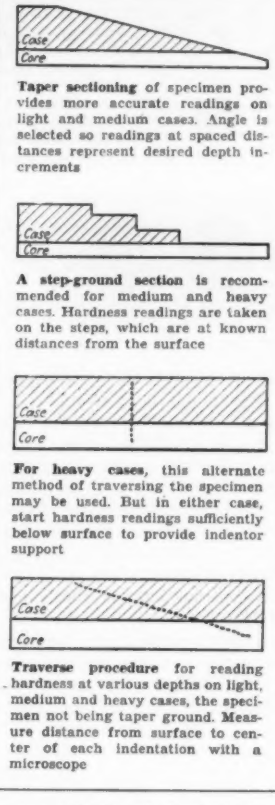
In this method, a round bar or ring is ground to maximum runout of 0.001 in. for taper and OD. Generally made of steel like the work, the test piece is carburized with the charge.

After discharge, it is slowly cooled in lime or quenched and tempered to machinable hardness. Straightening of the test piece to a runout of less than 0.001 in. is essential. Then successive depths, say 0.005 in., are machined off. The samples for successive depths are chemically analyzed for carbon content.

6. The popular *microscopical* method requires time and effort. A section taken normal to the case is given the proper polishing treatment for a metallographic sample and is then viewed under a high-power microscope. Case and core can be studied with the material in the hardened or slowly cooled condition, depending upon the characteristics that are of interest.

If the sample is hardened, the analyst may study depth of carbon enrichment, distribution and condition. It will be seen whether the structure is wholly martensitic, partially martensitic plus residual austenite, or contains excess carbides in solution, as networks or spheroidal masses. The hardened core can also be studied. Demarcation between case and core is difficult to determine. Nevertheless, in the author's opinion more information can be obtained from study of the case in the hardened condition than in the slowly cooled state.

When the slowly cooled sample is examined under the microscope, it is possible to measure case depth, to estimate the depth of excessive carbides if present, and to form an idea of the normality and grain size of the structure.



Taper sectioning of specimen provides more accurate readings on light and medium cases. Angle is selected so readings at spaced distances represent desired depth increments

A step-ground section is recommended for medium and heavy cases. Hardness readings are taken on the steps, which are at known distances from the surface

For heavy cases, this alternate method of traversing the specimen may be used. But in either case, start hardness readings sufficiently below surface to provide indentor support

Traverse procedure for reading hardness at various depths on light, medium and heavy cases, the specimen not being taper ground. Measure distance from surface to center of each indentation with a microscope

More specialized methods of case-depth measurement usually involve use of grinding and measuring equipment

Highly Technical Method

7. The *martensite-start* (Ms point) method of determining case depth was developed by Rowland and Lyle[1] to obtain sharp demarcation between the martensite formed at a lower level of carbon content and the freshly formed martensite at the chosen level of carbon content. The technique involves heating a sample in a salt bath to the transformation temperature that produces complete solution of carbon at the carbon level desired for measurement. Then, the part is quenched into salt at the temperature of martensite formation at this carbon level. Holding period is long enough to temper the martensite formed at lower carbon levels. Thereupon, the test piece is water quenched. A polished and etched specimen is read with a Brinell glass to determine the depth of the line of demarcation between the freshly formed martensite and that which was formed before reaching the holding temperature. Although this method appears to be reliable, it is technical and requires special equipment. Hence, the procedure is not attractive to smaller laboratories and heat-treat departments.

In Conclusion

The purpose of these articles on "Good Carburizing Practice" has been to explain the more important details involved in industrial carburizing procedures. The subject of carburizing can be treated much more extensively, but it is believed that sufficient information has been provided to help others in the field to improve their operations.

[1] "The Application of Ms Points to Case Depth Measurement" — 1946 *Transactions*, American Society for Metals, Vol. 37, p. 27.

Double-Coated Adhesives... FIXTURES FROM A ROLL

BY C. O. T. BOLLING
Manufacturing Engineer
WESTINGHOUSE ELECTRIC CORP.

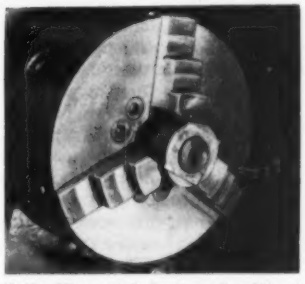
Nonmagnetic-stainless block is surface-ground to customary cut depth with only double-coated adhesive holding it to magnetic table. Part with thinner section but same area (8 sq in.) would require lighter passes with wheel

CELLULOSE tape, the ubiquitous household repair-all, has a new use. A special kind of tape (Scotch Tape Tissue #400) has adhesive material coated on both sides of the strip, which allows it to become a bonding agent between two other surfaces. A somewhat startling use for the tape is in making machine setups where soft or nonmagnetic parts must be held to tables or chucks, but cannot be clamped.

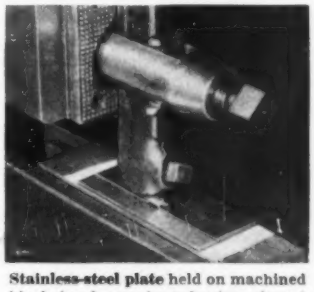
Probably the best application of the material is on the surface grinder. Tape is stripped off the roll, laid down on the grinder's magnetic table, and the part is placed on top of the tape. The tape should be larger than the part to insure that the maximum area of contact is utilized. The setup is finished by tamping the part with a deadweight or no-bounce hammer.

When coolant must be flowed on the work, some added precautions are necessary. The tape is trimmed to fit exactly, and a bead of shellac is applied around the edge of the tape to prevent coolant from getting under it to loosen the bond. Coolant can be applied immediately after the shellac is applied.

There are practical limits to the idea, of course. Parts held this way must be fairly light and have a fairly large surface area for bonding. In some cases, normal machine feeds and speeds can be used, but often the depth of cut must be reduced to prevent the tool from shearing the part from the tape. Both table (or whatever surface the tape is applied to) and part must be wiped clean before they are bonded. Tape cannot usually be used twice because it will twist and crinkle when the first part is released. However, holding qualities are good. In fact, it may be necessary to pry off the part with a wedge-shaped tool if the part is thin. Larger parts can be bumped or pulled off.



Soft-rubber part is turned without distortion when taped against end of soft-steel bar held in chuck. Pressure from tailstock forces rubber against tape during setup. Cut depth is as much as $\frac{5}{8}$ in.



Stainless-steel plate held on machined block in shaper jaws by tape is cut at 100 strokes per minute. Cut depth is 0.010 in., crossfeed is 0.010 in. per stroke

THE SHOP STEWARD PAYS HIS WAY

Britain's changing industrial picture demands basic changes in the old concept of trade unionism. The new relationship between management and labor is here interpreted by a former shop steward

BY C. D. MACKINNON, AIRDRIE, SCOTLAND

AMERICAN dollars, today, form the pivot around which Britain's economic and industrial program revolves, and intensive efforts are being made to capture and extend the dollar market. Our economic survival depends largely on our success in this direction, and this change in British policy is having a profound effect on every aspect of industrial life. The dollar offensive is blasting away old traditions, and new concepts are taking their place.

Nowhere is this more forcibly brought to our notice than in the workshops, in the changed relationship between management and men. At long last, the lesson would seem to have been learned that example is better than precept, and that disciplined cooperation is the answer to most of our labor headaches. The greatest noticeable change is in the attitude of the "high ups" to what used to be known as the "shop-steward problem." That problem is solved, because the principle of accepting the steward as an integral part of management is now freely and willingly accepted.

A few early experiments were not successful, because of lack of experience and understanding of the new outlook on both sides, but much of the recent collaboration carries the imprint of vision and imagination. Some forty years ago, because of the ever-present possibility of victimization, only young, unattached men could be persuaded to risk the unpleasant consequences of taking office in trade-union work. Now, however, the shop steward is regarded by employers as a respectable member of society, to be accepted in conference without demur. And throughout industrial Britain today, it is conceded that a discerning shop steward can be of immense assistance to management.

Full Employment Problems

The clamant need for dollar currency has led to the opening up of new markets and the intensive exploitation of existing ones. This, in turn, has brought about a condition of full employment, with an acute shortage of skilled labor. In the circumstances, with no pool of unemployed to draw on, greater elasticity in the realm of trade union restrictions is a matter of urgency and common sense. This is only one of the many spheres in which the influence of an intelligent and cooperative shop steward can make itself felt in the interests of the common good. It is of even greater moment to the rank and file, with their slender resources, than to the financially stronger employing class, that no obsolete trade-union restrictions be permitted to impede progress.

Full employment has brought its own problems, and most thinking people in Britain agree that their solution demands a high standard of cooperation between employer and employed. Indeed, many are convinced that the quality of the shop stewards of the future must be regarded as a matter of national importance if we are to attain the production necessary to pay our way. Born of recurring unemployment, and often of grinding poverty, the trade-union "line of demarcation" took shape in the early days of the movement. Scarcity of jobs impelled the several unions to fight for every scrap of work which they could reasonably—sometimes unreasonably — claim for their members. Unfortunately, that piece of trade-union legislation, with its frequent disputes and strikes, has been a drag on the wheels of Britain's industry ever since.

In these times of almost-over-employment, the supreme task is to convince the rank and file that the demarcation complex is outmoded and, if persisted in, can lead only to disaster. A word in season from shop stewards, drawn from their own ranks, will do more to change their thinking than would hours of persuasive talk by learned economists.

Enlightened opinion among management and men is becoming increasingly conscious of the value of genuine cooperation, a spirit

of give and take begins to pervade the industrial atmosphere, and most of its sponsors in management are now aware of the value of a level-headed shop steward.

Alert, progressive managements, taking a keen interest in the matter of personal shop contracts, are giving a great deal of thought to the type of shop steward presently met with in the shops. Compelling circumstances have brought to their notice the fact that choice of a shop steward is a matter of supreme importance to any industrial concern. The more astute are realizing that, while the actual appointment is not in their hands, they can, if sufficiently alert, influence the choice to a degree not hitherto appreciated. By wise and sympathetic handling of the shop personnel, through the foreman and, to a limited extent, by direct personal contact with the men, they can, indirectly, make the appointment. If management is in reasonable and reasoning touch with the rank and file, particularly with the older and steadier employees, and can make them feel that their views on administrative matters are of real value to the company, the whole atmosphere of the shop will benefit.

Choosing the Steward

When these men believe that they really are being regarded as of consequence, and that active participation in union affairs will not be frowned on, and will not bar their future progress with the company, and when they feel assured that participation will actually be regarded with favor by their employers, they soon begin to assert themselves in the interests of cooperative good will, both in the shops and at union branch meetings. From that stage it is but a short step to appointing one of their number to be a shop steward, when need arises. After all, the majority of trade unionists are sane, peace-loving folk, with a poor opinion of the noisy, quarrelsome element found in most organizations. Furthermore, nearly all responsible union officials prefer reasoning conciliation to carping hostility, and are always glad to see experienced men of moderate views appointed as stewards.

Union branch officials are always well posted as to the executive quality of all managements in their area, part of a shop steward's duties being to furnish such information. This is usually supplemented by the ordinary members' views and opinions. The mind of the branch officials on all matters concerning the interests of the union carries much weight with the rank and file. If they are favorably impressed with the shop steward's reports of a particular plant, and if the experienced, ordinary members are satisfied with their jobs there, they will cast the weight of their influence in favor of experience and moderation when a shop steward appointment is being considered.

From this, it will be seen that enlightened management can, in a very real sense, influence the appointment. A branch official's job is a spare-time occupation, usually unpaid, and the work is exacting and plentiful. The shop stewards who consistently report "no complaints" are the ones who help them most and lighten their labors. If a management is difficult to work with it is a thorn in the flesh of the branch officials, and it is only with difficulty that the best type of member can be persuaded to accept the, then disagreeable, position of shop steward. In the sense that a nation usually gets the kind of government it deserves, so a management will usually get the type of man it deserves as shop steward.

The term "management" necessarily includes foremen, since it is now recognized that much of a foreman's time is taken up with managerial functions. While it is good psychology for the highest executives to be on easy terms with their employees, it requires of the executive a nice sense of values, and calls for much circumspection. Too much hail-fellow-well-met can, in some circumstances, do more harm than good. Even otherwise sensible men have been known to become uppish to their foreman as a result of too much attention from the manager.

Grievance Procedure

It goes without saying that the foreman's status and authority must always be recognized by those in authority over him, and that on all points at issue the shop steward must, in the first instance, give notice of a complaint to the foreman concerned. If shop atmosphere is good, the men's advocate will probably be reasonable and broad-minded, and settlement of the issue by him and the foreman can be looked for. Failing this, the foreman must report the matter to management. That is the rule of the road. It is fair and equitable to all concerned, since it affords management time to review the position in collaboration with the foreman, before calling in the shop steward. The men and their representative will, of course, have discussed the matter fully before approaching the foreman.

Every works cannot hope to have ideal shop stewards, but tact and imagination on the part of management can work wonders. Difficult, even perverse, shop stewards can cause little real trouble in a well-ordered works, and ways and means of getting around flimsy complaints present no great difficulty to resourceful management. If a way around can be found which enables work to proceed, and at the same time gives the shop steward the feeling of not having been turned down, that way should be taken.

It is dubious practice to skate on thin ice in the matter of agreements with the unions. If these are interpreted as fairly, and even generously, to union members as circumstances and higher counsel dictate, much of the sting can be taken out of the complaints of the captious shop steward.

Strip stock flows from left to right, from feeder, through press, then (as scrap) up conveyor and falls into bins. **Blanks** flow from press out to the tilted stacking fixture (right) on belt conveyor that goes through press at right angles to stock flowline. Roller on top of belt makes blanks fall flat on stack

BELT HANDLING MOVES PRESS BLANKS

BY E. B. FASSEL, Manager Davenport Works, ALUMINUM COMPANY OF AMERICA

SOMETHING new under the press — a cross-belt conveyor — is installed in a Warco press at Alcoa's Davenport Works to deliver blanked aluminum-alloy stock from the press throat to a stacking fixture at the front of the press. Based on a conveyor development at Alcoa's Edgewater Works, and designed to fit under a 36 x 28 x 4-in. bolster plate, the conveyor discharges blanks that are eventually drawn into ice-cube trays for domestic refrigerators.

The belt is two-ply duck, coated on both sides with oil-resistant synthetic rubber that holds up even when the strip stock is coated with lubricants. Brackets on the sides of the press support pulleys that guide the belt through an opening formed by two parallels that hold up the bolster. Spacing and clearances allow the belt to run freely, carrying the blanks to a tilted stacking fixture without scratching or bending them.

Power is provided by a constant-speed motor, roller chain, and sprocket driver at the rear of the press opposite the stacker. The constant-discharge speed has been found suitable for keeping the blanks separated on the belt, even through the cyclic rate of the press may be altered during a run.

Extension of the conveyor to any reasonable length and to any stacking-fixture location is practical. In addition, the sprocket size can be changed; or an adjustable-speed unit can be added to take care of any change in blank size or shape.

Other materials-handling equipment added to the same press and others like it includes coil feeders driven by adjustable-speed dc motors that can push stock into the press at speeds up to 100 ipm. Scrap is discharged by a motor-driven conveyor into lift bins. Stock up to 18 in. wide and 0.125 in. thick is handled by the two synchronized flowlines.

how modernizes

You can't be half-hearted about modernization

BY E. J. TANGERMAN, EXECUTIVE EDITOR

SACO-LOWELL SHOPS, Biddeford, Me., has built fine textile machinery for 136 years, but almost died in 1926. Repayment of debts and World War II brought the Shops up to 1946 with an obsolete, run-down plant, without modernization or even adequate maintenance for two decades. Spending a million a year for five years has cut total equipment 27% and increased output, has "retired" 1743 machines; half the tools now are less than ten years old, and productivity and profits show satisfactory gains.

But new equipment couldn't do the job alone. Here is the absorbing story of some of the changes that had to go along—the 8-point program that executives insist is really only well started, the policy and method changes that make the new equipment worth its cost. Here, for every metalworking shop, are cost-cutting ideas and suggestions that Saco-Lowell has evolved the hard way—by sweating them through.

A SPECIAL American Machinist REPORT TO METALWORKING MANAGEMENT

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Waiting for the Junkman—October, 1949, and several hundred scrapped tools are set along 400 ft of curb—but the industrial trucks, the small buildings and even the street are new, necessary changes to accompany re-equipping. When one member of the Board saw this array, he commented: "If these could have been scrapped years ago, we'd be better off today!"

MERCHANTS BUILT AMERICA'S FIRST

how modernizes

a quick survey of the beginnings of Saco-Lowell

Machine building really began in America a century and a half ago—the American Industrial Revolution that converted some merchants into manufacturers and ruined others as the old economic system crumbled. In this period of upheaval, three companies were formed that, almost a century later, combined in 1912 to become Saco-Lowell Shops. All three were sired by textile companies—were in effect the machine shops of textile mills. The parent companies gradually disappeared, but their offspring remained.

As the nineteenth century began, England was 50 years ahead of America in building textile machinery. Americans started their first "spinning factory" in 1790, but the 300 mills in 1810 still provided their yarn to hand weavers. Francis Cabot Lowell, youthful Boston merchant, went to England in that year and travelled widely "for his health"—a device to divert suspicion from alert prying into English trade secrets. In 1813, he founded the Boston Mfg Co at Waltham, Mass., and began construction of looms and other machines like those he'd seen in England, using blacksmith-mechanics who at best could attain a tolerance of 1/32 in. Within a year, he had purchased two competing looms—for $100 and $200—from which to add ideas to his own design, and his machine shop was in operation.

The Perkins mill at Newton, Mass., started by an entrepreneur of that name at the same time, didn't get off dead center until 1823 because of the influx of English goods. Then Otis Pettee, a village mechanic, built the machine shop to make machinery for that mill.

Meantime, at the Saco Falls 90 miles north of Boston, an iron works had been built in 1811. In 1825 the Saco Iron Works was chartered to manufacture iron, steel and cotton goods—which began the shift of large cotton factories to Maine and a mad scramble for water rights that touched off an orgy of land speculation.

Thus all three founding companies were really machine shops—or workshops—of textile companies at the start. The major tool was the file. Some figures from Lowell's shop, largest of the three in the 1800's, illustrate this. Not until it was a year old did Lowell's shop buy a roller lathe, a fluting lathe, and a cutting engine—for $251, as compared with $1,081 that year for hand tools.

By 1817, Lowell's shop began selling machinery to others, marketing $7,498 worth in seven months, at a profit of $2,030. It is evident that, coupled with the patriotic idea of spreading the use of power machinery and the practical one of utilizing excess capacity of the machine shop at a profit, was the ingenious idea of disposing of obsolete equipment so more-efficient types could be built for replacement. At the same time, the profitable licensing of patents was begun—for the first time of any importance in American industry.

In 1817, there wasn't much of a machine-tool industry. Lowell's shop appears to have purchased one machine tool of a type—and used it as a model from which to make others. In February, 1817, when 2,000 spindles had been built, the shop had 2 cutting engines ($390), 1 fluting engine ($80), 4 roller engines ($730), 1 polishing machine ($50), 8 lathes for turning ($800)—but 19 vises, 9 small and 2 large grindstones, 6 grindstones with frames, 3 anvils, and $195 worth of new files! Total value of the shop was $4,867, less than half of it machine tools!

Here are some material prices in 1817 and in 1824, showing price declines as the Industrial Revolution got under way:

	1817	1824
Brass wire, lb	$1.00	$0.80
Coal, basket	0.28	0.21
Blistered steel, lb	0.18	0.12
Shuttles, ea	1.23	0.40
Iron wire, lb	0.18	0.04
Cast steel, lb*	0.26	0.21
Emery, lb	0.25	0.15
Block tin, lb	0.50	0.25
Cast iron, lb	0.08	0.06

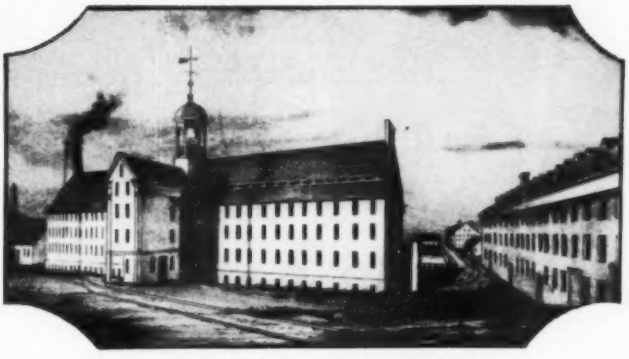
** In 1814, price was $1.35 per lb, in 1816, it had dropped to $0.33!*

Labor was paid day rates. In 1817, however, this was $1.43 average, surprisingly high, the range being from $1.75 (16%) to less than $1 (10%). By 1824, increasing mechanization brought less skilled help, so the average had declined to $1.20 per day, with only 10% in the highest bracket and 17% in the lowest. It was customary all through that period for work to begin at 4 am and end at 7 pm, with ½ hr out for breakfast and ¾ hr for dinner in summer, and from daybreak to dark in winter. For comparison, Biddeford rates were $1.25 to $1.75 in the period 1870–97, Newton rates $1.57 in 1882; Biddeford rates $1.54 and Newton rates $1.65 in 1910, an

doom to chipping

In 1839, the Locks and Canals Company imported a Whitworth planer from England. This machine virtually eliminated the old process of hand chipping with hammer and chisel. The machine shop also purchased from Whitworth in 1839 a "self-acting upright drilling and boring machine—one of the earliest known to have been set up in America.—*The Saco-Lowell Shops.*

MACHINE SHOPS...To Tool Their New Mills



The Lowell Machine Shop in 1850, from a pictorial map. Reproduced by courtesy of the Boston Public Library.

active year. This was 16 to 17 cents an hour for a 58-hr week.

Development and growth of textile-machinery building is a fascinating story—but not our story here. The period from 1813-53 marked the rise of machinery building—the fountain-spring of our Industrial Revolution—mostly of textile machinery, for the manufacture of cloth was our greatest industry then. If you wish to study it in detail, the surprisingly frank and thorough book, "The Saco-Lowell Shops," by George Sweet Gibb (Harvard University Press, $7.50) is now available. From it, this short outline has been taken.

The Stage Was Set By Debt

1927-40 was the lean time, when Saco-Lowell was saved from collapse — but the plant had to be drained dry to do it

In 1926, Saco-Lowell Shops were big—*and broke*. For years they and parent companies had been among major producers of textile machinery. But S-L had been, at various times, provincial in sales effort, plants were in many locations, management was reckless, inexperienced and incapable of handling its widespread operations. Costs were mounting, operating losses for several years showed debts of $6 million against cash of only $2 million.

National City Bank, in a survey, had decided that the situation was too bad for liquidation—small stockholders would be wiped out and even preferred claims would be settled at only 84 cents on the dollar. The report recommended "a new president, a big-visioned, practical and experienced executive, regardless of his particular manufacturing technical experience." Other financiers felt the case was hopeless—crushing debt, depleted reserves and working capital, and stagnant business.

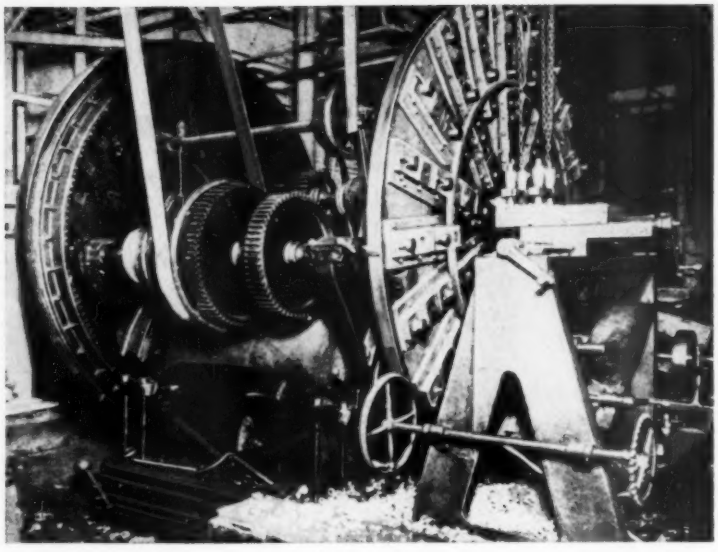
When David F. Edwards agreed to take the presidency, his friends called him a madman. A former teacher and General Motors executive, Edwards had a graduate degree in economics, had been an Ordnance major in World War I, had liquidated or reorganized a number of small automotive companies, had reorganized Wickwire Spencer as its president, and was teaching at Harvard Business School. But he was intrigued by the problem, and felt the appraisal of the situation had been in error: There was only one formidable competitor, little likelihood that others would rise, demand was steady (if not always high), and recent management had obviously been inept.

Edwards proved to be farsighted, honest, friendly and eminently practical. He was gruelingly thorough and professorial, and took the authority that was his. He was not spectacular or "high-powered" in his methods, but he remolded the managerial staff, cut inventories, sold surplus real estate and equipment. Then he abandoned the 102-year-old Lowell, Mass., shop, the Kitson shop there, and finally the Newton, Mass., shop to cut operating costs.

By 1940, the rehabilitation was complete. All notes had been paid, with interest—a total of almost $10 million! Stockholders had suffered considerable losses and had no dividends from 1927 to 1937, but their stock now was paying and had some future. Selling effort and design-development leadership had been actively maintained; indeed there was evidence that Saco-Lowell, despite reorganization, was producing for less money than competitors.

From 1941 through 1944, Saco-Lowell turned out over $44 million in non-textile items, but continued development work where it could. As 1945 opened, war contracts were gone, the plant required reconversion, and deferred maintenance had to be done. But most important, little new equipment had been bought for 18 years while debts were cleared and war contracts executed. The plant had been drained dry to save the company.

how modernizes



Built in East Boston in 1820, this lathe is Saco-Lowell's "most historic machine tool." It was probably first used in the Waltham shop. Repaired and modernized, it turned parts for a Civil War ironclad, was finally scrapped after World War II

SHOP RE-EQUIPMENT IS A COMPLEX JOB...

there's more to it than just ordering new machines

At the end of World War II, Saco-Lowell Shops were for the most part housed in typical old mill buildings, jammed into a jumbled group on both banks of the roaring Saco River in Biddeford, Me., hemmed in on the sides by cotton mills and the town. More than 3300 units of shop equipment, few under 20 years old and some over 100, were scattered about in heterogeneous fashion, mostly driven by belts from lineshafts as machines were long ago. Units of a type were largely together on the same lineshaft. Some of the older machines remained permanently tooled for replacement or special parts and were used only when that part was needed. Reconversion had left some operating scars.

Many a metalworking executive dreams of the chance to rebuild such a plant, to dig ruthlessly into the forest of belts and emerge with a modern layout and uptodate machines, with all the savings the idea implies. Of course, this dream assumes adequate funds for the modernization, an acquiescent and enthusiastic administration, and omits any concept of the less palatable parts of the job.

David F. Edwards, president of Saco-Lowell, recognized the need for change, but with it had a concept of the problems that go along. The company was doing an enormously expanded volume of business, so ready cash was strained. The old management was neither young enough nor trained for the postwar situation. In short, an operating reorganization was required, but without impairing current production or operations. There were thus administrative managerial, production, labor, financing, and building problems. They demanded youth, energy, verve, new ideas, and optimism.

The man Mr. Edwards picked to do the job was John Chafee, 49, onetime marketing executive of Brown & Sharpe Mfg. Co., where he had risen from a shop apprenticeship. In November, 1942, he had gone to Washington as deputy director, and later, director, of the Tools Division, WPB, in 1945 had become director of the Equipment Bureau, and in February, 1946, joined Saco-Lowell Shops. When he came to Biddeford in February, 1947, as the new vice-president in charge of manufacturing, he brought along Sven Vaule, production engineer, who later became works manager; their instructions from Mr. Edwards were to attack the problems without interrupting production.

Some steps had already been taken toward modernization, and the new management moved to go on. New high-speed machine tools were bought and installed—but didn't perform much better than the ones they replaced. Meantime, study of the plant began to point

to the answer: **It was no use to put new units into departments that were not doing well with the equipment they had. Efficiency had to be built first; that takes time.**

At the beginning, the new management faced the problem of gaining acceptance, for much of the working force was united in its coolness toward, and deep-rooted suspicion of, strangers—even though some had been "strangers" themselves (from Lowell and Newton, Mass.) not too many years before.

And beyond the hurdle of acceptance lay a variety of operating problems: Standards for operation varied or didn't exist, inventory was dispersed, piece counts were inaccurate, and some showed manipulation. For many items, there were no stocks of finished parts—merely stacks of blanks and partly completed pieces all over the shops. If somebody wanted something, he hunted it up. In one section of the plant, hundreds of thousands of pounds of work in process had to be handled in one overloaded elevator serving 15 levels in three large interconnected multistory buildings; there were only a few power trucks for the whole plant. Many floors had load capacities of less than 100 lb/sq ft. Maintenance was at a low ebb; even new machines were neglected.

The re-equipment program thus became one of eight objectives—and not the initial one either. It is important to realize this, because any adequate replacement or re-equipment plan should include consideration of concurrent conditions. Here are the goals set up at Saco-Lowell:

1. Centralize control over issuance of manufacturing orders.

2. Install adequate inventory records and stores procedure.

3. Prepare process sheets for all parts, listing best prevailing shop practices.

4. Install effective timekeeping procedures to control time spent on operations and piece counts.

5. Provide sufficient space for inventory storage.

6. Repair and replace tools and equipment, and establish controls for manufacturing tools and supplies.

7. Install new materials-handling methods.

8. Make essential improvements and additions to buildings.

Obviously, the major objective in these goals is to centralize controls—which most big plants had begun years ago. Executive chains of command were clarified, individual responsibilities defined, outside consultants were brought in where necessary and a hard core of qualified men built. This took 18 months, while some obvious re-equipping and modernizing was done. The completely clerical office system was supplemented by IBM machines for payroll accounting, material accounting, sales analysis, accounts-payable distribution, budget reports, and some other accounting functions.

Substantial reductions in inventories and better anticipation of materials requirements have resulted from installation of production-planning and inventory-control systems. This is particularly important now, when materials are so difficult to procure. Controls have also improved deliveries. Currently, an average of 100 railroad carloads of completed machinery is shipped on time each month, plus 18 carloads of repair parts.

To accomplish this, manufacturing orders for 3500 different kinds of parts are issued to machining departments each week, and hundreds of orders go to vendors for raw materials and parts—700 different kinds and sizes of steel alone are purchased.

Again, before modernization there were no tool cribs and no tool records, except for a partial record of jigs and fixtures maintained by the superintendent of the Methods & Equipment Department. The foreman in each department issued his own purchase requisitions for perishable tools and for some semi-perishable tools. In several larger departments, foremen had their own toolmakers to produce jigs and fixtures.

Now, each machining department has its own tool crib, well stocked with perishable cutting tools, but it is controlled from a master stockroom which specifies the grades and sizes of all HSS and carbide cutting tools, drills and reamers. In addition, toolkeepers have been trained and tool design centralized. Changeover to the tool cribs was a big undertaking of itself, for it involved elimination of "private stocks" of tools in workers' personal bench drawers and standardization of perishable tools.

Purchase and installation of tool-crib shelving alone cost $125,000. In addition, much expense was involved in gathering up, identifying, classifying and standardizing the great variety of tools, jigs and fixtures scattered throughout the Shops. The program is now functioning smoothly, however, and the cost of centralization is more than equalled by improved service to machine operators. Central and tight control is now maintained over an inventory of about $2½ million worth of perishable

modernization 90 years ago

Supt. Wm. H. Thompson reported in 1860: "By the addition of $12,000 of new tools within the past two years, which in 1860 are worth twice their cost, the shop can employ 100 more men than ever before . . . Putting in a steam engine cost $11,000, but saved 50 days of production." Gas was installed in the shop the same year.—*The Saco-Lowell Shops.*

expensive pig

In 1839, the Locks and Canals Co. used 1,225 tons of cast and wrought iron. Company records for that year show the best Pennsylvania boiler iron cost as much as $160 a ton, $25 more than imported spring steel. Best American pig iron cost from $35 to $40 per ton, the approximate range of Garthshire, the best Scottish pig. Inferior grades of American pig ranged from $27.50 to $40.00 per ton.—*The Saco-Lowell Shops.*

and semi-perishable shop tools.

Through all this upheaval, the "shop force" began to respect and admire Chafee and Vaule and their methods. The organization began to believe they meant what they said, "There are no unimportant people in this business." A "Down-Easter" respects men with square ideas, and the "gump" to get things done. So output and production efficiency have climbed—and profits too. The score has been: 1946—$778,000 net profit; 1947—$3.36 million, 1948—$4.6 million, 1949—$5.2 million, 1950—$2.9 million (on much lower volume).

Administration of the improved controls has of course required added personnel in the methods, time study, production control, stores, and inspection departments; but production per total direct and indirect payroll hour has increased, and quality is even better. Output per machine hour and per square foot of floor space is up.

Also, installation of a workable system of quality control has cut scrap and rework in some departments as much as 80%. Taking the mystery out of the control method and showing the operators how to read and follow quality charts on machines has made them feel as though they are part of the team. Further, machine-capability tests indicated that some machines could not maintain the tolerances operators were expected to hold. Saco-Lowell had to rebuild or replace these machines because they were not good enough. Some modernization, at least, was thus done in unexpected places.

Other Concurrent Steps

Study of the re-equipment program unearthed the need for many other concurrent steps to make the new equipment operate efficiently. Basically, there was a shift from departmental to straightline production where quantities were high enough to justify it. This meant wholesale rearrangement of equipment in some departments, but it cut down the tremendous amount of backtracking and hauling that develops in crowded, multi-story mill buildings. Even so, a plan for inter- and intra-departmental handling had to be developed, plant transportation was increased from 17 heavy power trucks and 28 trailers to 60 heavy and 39 light power trucks and 329 trailers, hand-powered vehicles and containers standardized, and regular depots established.

Passageways have been cleared, jobs kept together, parts stores installed, lighting modernized. The forest of belts is gone, but that doesn't mean all new machines. Over half the equipment is still over ten years old, but it has been individually powered, cleaned up, rebuilt, and in most cases, speeded up. The intention is to get the most out of every installed unit. If it doesn't work a high percentage of the time, or if it works at too slow a pace, out it goes, unless essential for standby.

Buildings still carry the marks of belt hangers and grease on ceilings, and of long years of wear on floors—there hasn't been time yet for "prettying up"—but it will be done. For men as well as machines have been modernized: the foremen and section hands (supervisors) have been trained to handle their new equipment, and operators are being trained in-plant for upgrading. A pride and spirit are developing that have overcome the uncertainty of a few years ago, and will push on through the paint-up phase as time permits.

Many Cooperated

Thus the changes are the result of cooperation by many men, some new to Saco-Lowell, but most of them local people. The changes are now better accepted by labor, management, and townspeople, for the executive group has abandoned the traditional New England custom of "saying nothing to the help". Shop personnel, and the twin towns, are apprised of contemplated changes before they occur, and the reasons for them.

For example, shop changes and new equipment are described in advance to shopmen, to get their ideas and cooperation. Once each month, the works manager, director of industrial relations, and the union leaders sit down together. At that time, each department's schedule and planned equipment are discussed. As a rearrangement or an equipment change approaches, the section leader (supervisor) and shop steward are also called in and informed of the plan and schedule and the expected benefits. Just before a new type of unit arrives, maintenance men from the department concerned are sent to the plant of the equipment builder for whatever time is necessary for them to learn its functioning and repair. Thus all shop echelons are thoroughly familiar with changes, and the surprise factor, source of resistance and resentment, is avoided.

There have been other changes to modernize Saco-Lowell, too, but we are not concerned with most of them here. Suffice it to say that there are now a working Industrial Relations Department, Job Evaluation and Wage Department, Medical Department, and full-scale apprentice and in-plant training.

Despite all the rearranging and introduction of new equipment, Saco-Lowell has maintained the best safety record of any company in its type of industry, according to Liberty Mutual Insurance Company. Last Fall, Liberty presented the Shops with an award of merit in recognition of the safety record of their employees and operation without a lost-time accident for 1,013,585 hours—an indication that the whole modernization program has been carried on in a well-planned, orderly manner under competent direction.

the $74 question

The apprenticeship period was three years, and the apprentices appear to have been bound not to the company but to skilled mechanics employed on job work for the company. In 1827, Paul Moody replied (to a mother) that her boy would be paid at $25 per annum the first year, $50 the second, $74 the third—and that "proper care will be taken that the money which he earns as above be not expended by him unwisely".—*The Saco-Lowell Shops.*

RE-EQUIPMENT STATISTICS SHOW THE GAINS

Half the tools now are under ten years old

SACO-LOWELL'S modernization program is not completed—probably never will be—but the re-equipment phase is well advanced. It should be pointed out that primary emphasis in most instances was on quality rather than increased production, which makes savings all the more spectacular.

The 5-year program has resulted in purchase of 850 units of equipment, retirement of 1743—or over twice as many—**with an increase in productive capacity.** As of Jan. 1, 1951, over 48% of the company's equipment is under 10 years old, and the 3270 units of 5 years ago have shrunk to 2377. Here are the details, according to M. C. Hutto, supt., Methods & Equipt. Dept.:

Year	Total Units Jan. 1	Retired	Bought
1946	3270	170	382
1947	3482	250	192
1948	3424	236	123
1949	3311	480	13
1950	2844	607	140
1951	2377	—	—
Total		1743	850

Total purchases in the 5 years are about $5 million. 1950 purchases alone totalled about $1,300,000, replacing units which were almost all in the "over 25" group. At the time of the *American Machinist* Inventory of Metalworking Equipment, a detailed survey was made. As of Oct. 10, 1949, the company had 3038 units:

Age, Yr	Units	Percent
0 – 5	442	14.6
5 – 10	563	18.5
10 – 15	121	4.0
15 – 20	56	1.8
20 – 25	100	3.3
Over 25	1,756	57.8
Total	3,038	100.0

Thus, at that time, the company had 67% of its equipment over ten years old. This figure in 15 months has shrunk to under 52%, through retirement of 607 units last year, almost all of them in the "over 25" age bracket, and addition of 145 more new ones. (Note that, although 710 units were purchased in the 4 years before the inventory, only 442 are in the 0-5 group. The others were surplus machines from World War II, modernized, but in the 5-10 bracket.)

Some indication of the magnitude of this re-equipping job is given both by the frontispiece and by the accompanying table:

Changes in Productive Units During 1949 and 1950

Month	1949 Retired	1949 Bought	1950 Retired	1950 Bought
January	1	0	51	22
February	8	0	71	10
March	58	2	47	19
April	0	1	40	12
May	57	0	44	15
June	33	3	68	3
July	25	2	11	6
August	5	0	61	12
September	20	0	65	12
October	151	0	34	2
November	37	0	57	19
December	85	5	58	8
Total	480	13	607	140

When the results of this program are studied in terms of production efficiency, some almost unbelievable gains have been made. It is difficult to show the effects of increasing power trucks manyfold in three years, from cutting crating cost as much as 30% in some cases, from installing a balcony for centralized finished-parts stores with a ready inventory, from introduction of production standards and methods control. But the advances from these steps may be imagined from description of some of the changes in productive setups.

The gear department, for example, now covers only half its former area and has 97 instead of the former 250 machine tools, with the same productive capacity. Better feeds and speeds have been introduced on existing machines, and units replaced where real savings can be shown. Cutter speeds for hobbing CI gears are now 100 to 125 fpm, with 0.040-in. feed in some cases, about double the old optimums. Gear shapers operate at 107 fpm with 2½-in. stroke and 0.0027-in. feed, cutting two gears at once at 325 strokes per min. On steel, shaper feed is 0.0022 in. per stroke. Gear blanks are roughed at 250 to 300 fpm, with ⅛-in. chip, finished at 500 to 600 fpm, with 1/32-in. chip; while CI is roughed at 250 fpm and finished at 400 fpm, with 0.020-in. feed in both cases. Carbide tools are used for all jobs except shaping.

In one lathe department, 13 new machines have replaced 30 old ones. Two Sundstrand lathes, facing both ends of a shaft to length and centering them, replaced nine old machines. A new Kingsbury 6-station machine, with drum feed, drills, reams, and countersinks both ends of a small roller, has cut time to 0.18 min per piece. Working only a week a month, it promptly paid out in labor and scrap savings.

Speed and feed increases are not always the answer; sometimes it is a complete change of process. For example, rolling has been found faster and cheaper than cutting threads and fluting spinning rolls.

Many examples are pictured and described; all show tremendous savings from carefully planned re-equipping and rearrangement. Each job has been carefully studied by methods men to obtain the best method for the conditions, then to install and tool the equipment properly, and lastly to train the operators to work efficiently and understandingly. This is a long-term, never-ending program; Saco-Lowell knows now that these successes are "only the beginning"—a challenge for tomorrow.

how modernizes

NEW TECHNIQUES PRODUCE BETTER

TEXTILE rolls are hardened and ground steel shafts ranging from 18 to 24 in. long and ⅞ to 1⅜ in. in diameter, depending upon use. They are joined one to another, end to end, to be permanently tight for assemblies 40 ft or more long, depending on length of the spinning or roving frame. This requires a screw joint with mating surfaces (tapered, threaded, and abutted). Rolls have 4, 6 or 8 raised cylindrical sections 1½ to 3 in. wide (all the same length in any assembly) spaced out along the surface. Raised sections carry patterns, either straight flutes irregular in number and width, or diamond precision-formed knurls. Each roll is supported in running position by a hardened and ground journal, so each roll shares the support of adjacent ones.

The original process was to turn shafts in engine lathes, grind, flute or knurl lands, caseharden in cyanide bath, anneal male end, straighten, thread both ends, and grind.

Fluting was a major problem. Spacing of flutes is irregular. Flutes have been cut for more than 50 years in a battery of multiple-tool planers. Rolls on V's, ten to a machine, were fluted by ten single-form tools downfed on center along the length of the rolls. Rolls were gang-indexed after completion of a flute. Tools tore the sides of the flute so badly that many rolls could not be salvaged; scrap ran as high as 35%.

This problem was partly corrected by mounting a second tool directly behind the first, so one cut one side, the other cut the other, thus permitting them to be ground with rake angle. This cut scrap to 10%.

Further study indicated that flutes could be broached at the rate of more than 100 rolls per hour per broaching machine; however, broaching was found to produce a surface in the flutes with little or no improvement over the planing method, because of the lack of side clearance in the broach teeth. Engineers decided that the thread-rolling principle could be applied to the job with remarkable improvement in surface finish and a lower cost over broaching because of the elimination of costly grinding operations necessary with either broached or planed flutes.

Rolls with rolled flutes are rough- and finish-ground on the OD of the flutes to remove the imperfections caused by the partial penetration of the rolling die teeth and to produce a finish smooth enough not to collect cotton fibers.

Coincidentally, the entire roll-manufacturing process seemed archaic, so the methods engineers changed the whole setup.

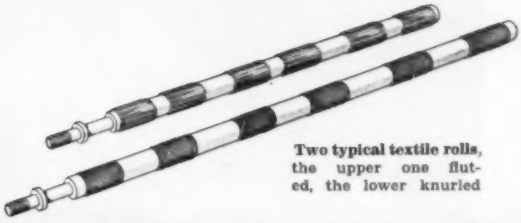
Methods analysis set up these requirements:

1. Attain roll interchangeability, thus eliminating selective fitting. Rolls must have less than 0.001-in. max. eccentricity after assembly, and tolerance of ± 0.010-in. max. in assembled lengths of 40 ft plus.
2. Caseharden wear surfaces to depth of 0.040 to 0.050 in. at R. 58-60 and maintain core hardness at not more than 212 Brinell.
3. Attain 10-12 micro-inch rms surface on OD of fluted surfaces.

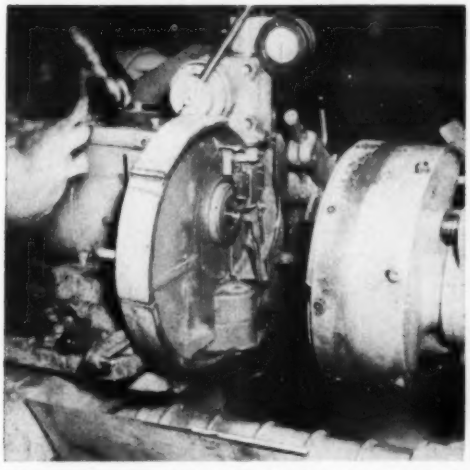
To meet these requirements, a completely new process was developed, key steps of which are shown in accompanying photos and in the separate article on induction hardening. Part times are given for the 1-in. dia x 19½-in. long fluted roll, a typical part.

Turning . . . This operation is now done in six Sundstrand 4x36, Type B, semi-automatic Stub lathes, two machines to an operator. Half of the body length is rough-turned in the first machine, the other half in the second. Only the bearing, pilot and thread sections are finish-turned. Two pairs of roughers and one pair of finishers are used. Cycle time is 1.87 min. for roughing, 0.87 min. for finishing (standard hour = 80 min.). Roughing speed is 140 sfpm, feed 0.008 ipr. Toolbits are triangular carbide in clamp-type holders. The first machine of each pair has a floating chuck and turns on centers. The second has an Erickson pneumatic chuck because the part can be held on a turned surface. Pictured is the second finishing operation. Each pair of Sundstrands retired four obsolete machines

TEXTILE ROLLS



Two typical textile rolls, the upper one fluted, the lower knurled



Grinding ID . . . The taper hole at the female end and the face itself are ground in a Bryant chucking grinder with an additional wheelhead (for face grinding) and a work-supporting device at the rear of the headstock. Machine cycle is 28 sec. Two internal grinders were released for other work by this installation

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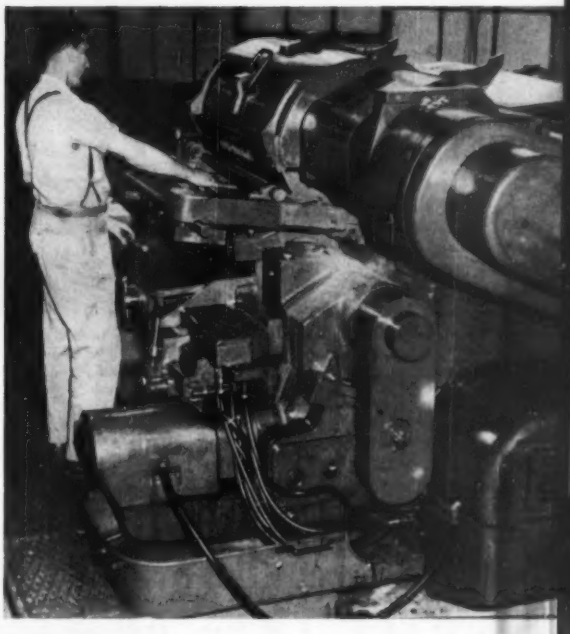
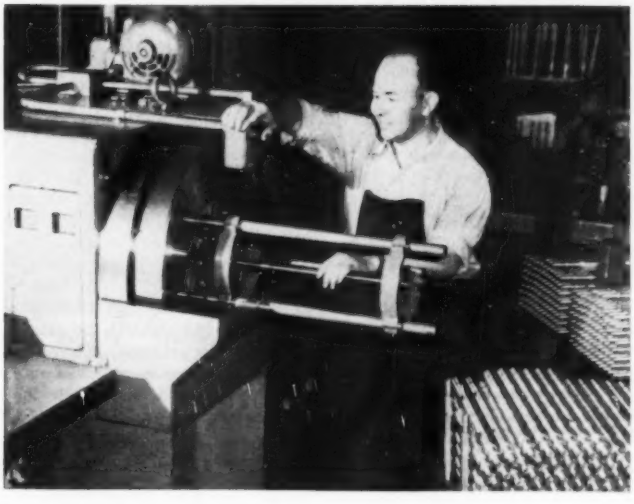
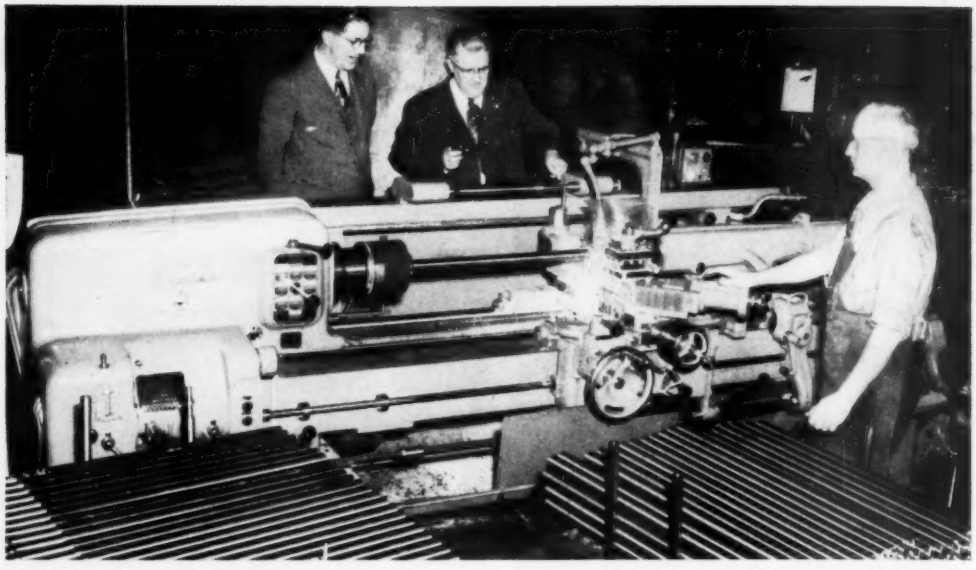


Grinding OD . . . Fluted sections are ground, after hardening on the OD, in a Cincinnati No. 5 semiautomatic infeed centerless grinder with a special workloading fixture. Machine cycle of 25 sec includes rapid approach, feed, dwell, and rapid retraction of the regulating wheel. Three thru-feed centerless grinders were released for other use



Threading . . . A Reed A23 thread roller, with outboard supporting fixture, rolls a 21/32-in., 14-tpi, Class 3 thread on the male end in a machine cycle of 5 sec, 3½ times as fast as formerly. Rate of penetration is 0.0004 ipr of the dies. Two old turret lathes were retired by this installation.

Fluting is also done by a thread roller in a similar machine. This is a distinctly new development in "thread" rolling. Flutes are so accurate and finish so smooth that only centerless grinding of crests is required. Knurling is similarly done also without previous step turning, releasing six lathes. Tolerances are held to 0.001 in., although knurling increases bar diameter 0.020 in.



Typical setup on a shaft duplicator. Work is held by a foot-controlled Erickson pneumatic chuck against a stop stock inside the spindle. The built-in ball-bearing center in the tailstock is moved up to position with an air cylinder, also foot-controlled. As the work starts to rotate, the carriage is moved up by rapid traverse until the stylus contacts the starting point on the master. Longitudinal feed is engaged and the part rough-turned to the carriage stop. This retracts the tool slide and returns it to starting position by rapid traverse. Toolpost is then indexed for finish-turning on the same cycle. This turns thread, pilot, and bearing diameters. The backfacing removes the 30° "going" shoulders to complete forming of the bearing end. The master bar is then turned end for end, and the roll turned as in the previous cycle, taking one cut only. Master bar is being pointed out at center rear

DUPLICATORS QUICKLY PRODUCE SMALL LOTS OF TEXTILE ROLLS

how *modernizes*

HUNDREDS of different contours are required for replacement or special orders of textile rolls, because here again, personal preferences or products of the customer are the major factor in specification. Forming lathes produced these pieces in 16-min cycle time, but were aged and inaccurate machines, incapable of handling modern tooling.

To speed the job, three 16-in. American hydraulic shaft-duplicating lathes were installed. They produce rolls from C-1114 cold-drawn steel in lots up to 200 pieces. Lengths range from 10 to 30 in., diameters from ⅞ to 2 in. Work is formed with three standard carbide tools, one for roughing, one for finishing, and one for back facing, held in a 4-way tool block. Occasionally, for greater accuracy, a fourth tool may be added. Tools are set quickly in correct relationship with a tool-setting gage.

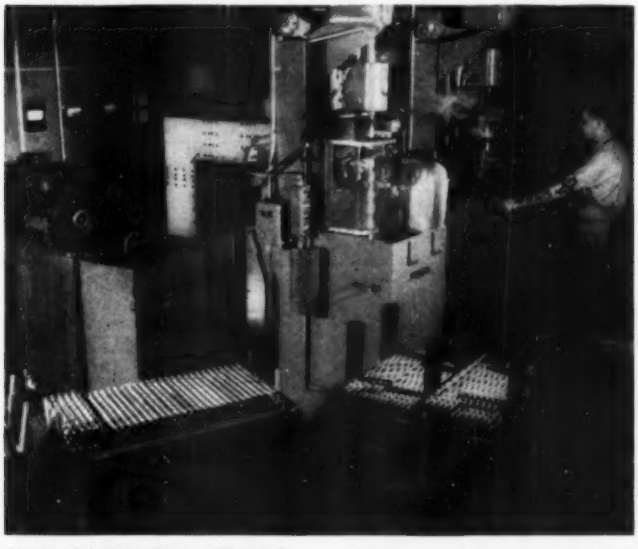
Cutting speed is now 500 sfpm, with feed of 0.009 ipr, holding tolerances of ± 0.002 with 0.005-in. eccentricity max. Complete cycle time is 4.7 min., or less than a third of the former time.

Rolls are turned half way in each cycle to prevent deflection from tool pressure and to match them within eccentricity limits.

The hundreds of different contours are duplicated from master bars. Master bars are round, held between centers on a carriage easily adjusted to correct relationship between master and work. Contours of the finished part are duplicated on the master, with an additional ¼ in. on the starting end and 30° "going" shoulders to prevent tool interference or breakage. As master bars are similar to the work and not hardened, they are made right in the manufacturing department. They last indefinitely, because stylus contact pressure is only a few ounces. Although the hydraulic circuit is very sensitive, no corrective maintenance has been necessary through many months of operation.

HARDER ROLLS... LOWER COST

OLD HARDENING METHOD . . . For many years controlled cyanide hardening was used (75 min @ 1500 F, followed by one-at-a-time quench, soda wash, and annealing of threaded end). But case, only 0.012 in. thick, was too shallow to retain full hardness if flutes and bearings were ground, required drilling and threading before hardening (thus jeopardizing joint accuracy), and quenching from prolonged red heat into cold brine produced runouts, on centers, of 0.008 to 0.062 in. Highly skilled men were required to straighten pieces to the permitted 0.003 in.



NEW HARDENING METHOD . . . Two fixtures for induction heating and water quenching are cycled so left-hand one, for the bearing at the male neck, operates only when the second fixture, for progressive hardening of the roll proper, is being loaded. Bearing end is heated with a ½-turn coil, possible because the piece is rotated. Hardness (R_c 58 min) depth is increased to 0.040-0.050 in., but core and male end are unaffected, so grinding of bearings, drilling, boring, and threading can be done after hardening. Only 35% of the rolls require straightening at all, and this is so slight that less-experienced operators can do it without difficulty, thus cutting costs

TEXTILE spinning rolls are 1-in. dia by 20 in. long, with male thread on a smaller-diameter section at one end, female threads in a bored and chamfered hole at the other. Roll surfaces are fluted on portions.

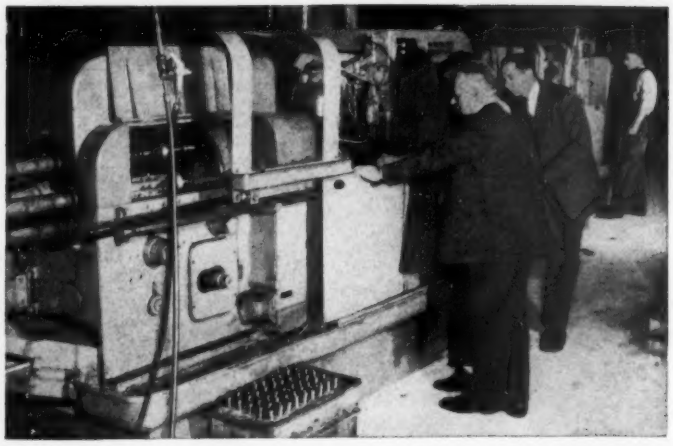
When they were cyanided, the rolls had to be taken down three floors in the overloaded plant elevator, trucked 1500 ft to the heat-treat department, then returned after treatment. Every roll required straightening, averaging 6.9 min, by skilled operators. Stock was AISI C-1117, cold-drawn (C 0.14-0.20, Mn 1.0-1.3, P 0.045 max., S 0.08-0.13).

By the induction method, 65% of the rolls are within the permitted 0.003-in. total runout on centers. Distortion on the remaining 35% is slight, permitting less-skilled operators, who average 2.24 min per roll. This inaccuracy has been traced to residual stresses from previous machining operations, so these are being changed to reduce or eliminate distortion. Stock was changed to AISI C-1144, cold-drawn (C 0.40-0.48, Mn 1.35-1.65, P 0.045 max., S 0.24-0.33).

The new equipment consists of a Westinghouse 50-kw rf generator and induction-heating unit with integral quench-sprays for the two fixtures and cycling relays so the second fixture alternates with the first. Cost was $51,000 installed, is expected to pay out in four years. The unit is right in the production line next to finishing centerless grinders, so all trucking and the added elevator trips are avoided. Other rolls, 18, 22, 22½ and 24 in. long, are treated similarly.

Comparative Costs	Cyanide	Induction
Stock, per 100 lb	$7.99	$9.14
Stock, (5.41 lb)	0.432	0.494
Fuel and material	0.0294	0.007
Labor, min.	1.31	0.75
Labor, cost	0.0262	0.015

Whirls were formerly of cast iron, left, requiring long machining lugs. Blowholes and hidden porosity affected balance, made one in four scrap. New whirls, right, are steel, hard-chrome plated, save material, cut scrap and are better balanced

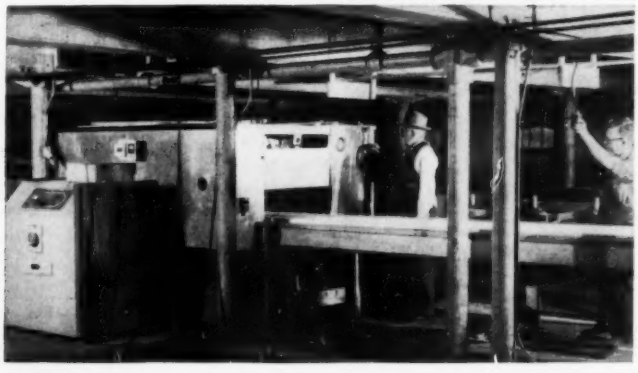


Two 5-spindle Warner & Swasey automatics and one Jones & Lamson turret lathe for short runs were installed to replace the 22 old machines and meet production requirements. Tools are interchangeable on all three, so tooling is kept to a minimum, and separate tools for short runs are not needed. This cuts tool inventory 66 2/3%. Modern tooling and machines thus produce a better product in less time, with tremendously cut waste of metal in scrap and chucking ends. The two automatics are pictured here

NEW MACHINES REDUCE OPERATING COSTS...

THE WHIRL, a belt-driven spindle carrier, has always been made of cast iron because of the hard wearing surface when once the surface has become glazed. But the whirl must be cast with a holding lug as heavy as the finished part to provide a grip for machining. Material defects were frequent; hidden porosity upset the delicate balance necessary for smooth operation of the whirl.

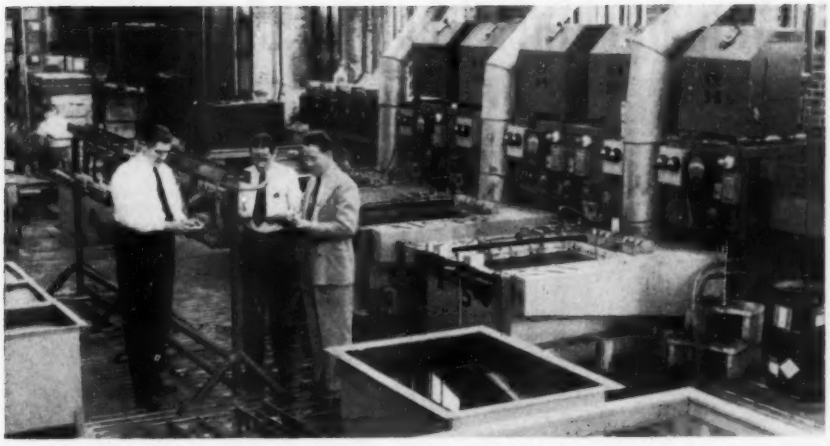
Machining was done on 22 machines that averaged 28 years old. They were of various types and sizes, thus could not be similarly tooled to perform like operations, so three different methods of manufacturing were necessary—which of course meant three entirely different sets of tools for each style of whirl. With the variety of styles necessary to meet various customers' specifications, the



Electrical Assembly . . . Edge-bonding press and rf generator solved the creel-board assembly problem

Dielectric

SEVERAL high-production items are assembled from pieces of soft or hard lumber, then planed and finished. Among more-important ones are spinning-creel boards, 9 to 14 ft long, 13 in. wide and 25/32 in. thick, assembled from two or three narrow strips of clear soft pine. Joints in board sections were formerly coated with hot animal glue, then set up in a rotary clamp carrier. Two men produced 120 boards in 8 hr, but glued joints



This hard-chrome-plating setup, complete with special carriers and modern handling devices, is used solely for plating whirls. Here methods engineers test carriers, specially made for various sizes of whirls. Installation made by MacDermid, Incorporated, Waterbury, Conn., is of the latest type, with automatic controls, cost $23,000 complete, but is considered justified by increased product quality and customer satisfaction

how **S** *modernizes*

YET SPINDLE QUALITY IS IMPROVED

tool inventory was enormous. Further, none of it could be modern high-speed tooling because machines were so old they could not handle it.

Study and tests indicated that a preferable substitute would be free-machining cold-drawn steel in bar form, turned in multiple-spindle automatic machine tools. But the surface of the steel deteriorated rapidly in the highly humidified air of the textile mills. Therefore, a second step was necessary: hard chrome plating. This resulted in a whirl superior in wear resistance and in balance to its cast-iron predecessor.

Three new machine tools were found capable of doing all the work formerly done by 22, and tool inventory for short runs could be cut two-thirds. New equipment is pictured here.

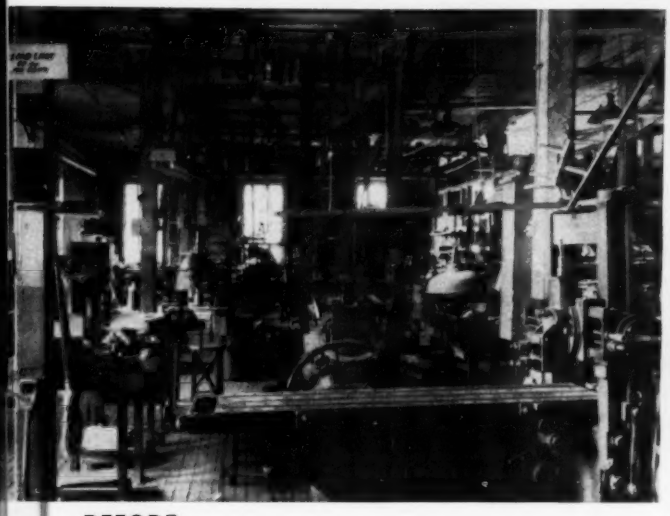
Bonding Cuts Labor 60%, Ends Spoilage

could not be planed until the following day and joint failures were frequent during finishing.

Press rolls are typical of hardwood assemblies. They are 4 to 6 in. in dia by 48 in. long and assembled of two 4x8x48-in. kiln-dried maple or birch blocks. Clamping pressure was exerted on only 40% of the joint during glueing, so joints failed frequently. Glueing had to be done in a high-temperature room to prevent glue from setting before hand screws could be applied to the full length of the assembly.

Postwar demand required higher production, so the method was modernized to improve joint quality, eliminate rejections, increase use of salvage lumber to compensate for increasing prices, reduce labor cost, and cut flocr space. The solution was a 10-kw Westinghouse rf woodworking generator, Weldon edge-bonding press and urea resin as a binder. With proper supervision, this dielectric set-up works equally well on hard or soft wood, has cut rejections to the vanishing point, reduces floor space 50%, permits bonded parts to be used almost immediately, increases use of salvage material 30%, cuts labor cost 60%. (On creel boards, one man now puts up 180 parts in 8 hr). Equipment cost $14,647 installed, will be amortized in 5 yr at the present rate of savings.

When 64 New Machines Replace 95 Clunkers...



BEFORE... Of 95 machines in the past-model repair department, only ten were less than 25 years old. Tools were crowded into so little space that, had they been capable of handling up-to-date tooling, no work areas were available for production flow. As a result, methods in most case were as old as the machines

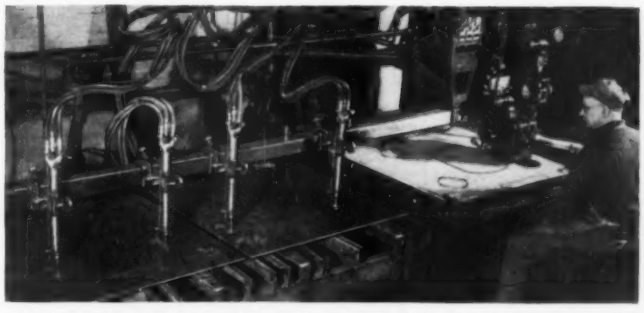
AFTER... Five millers and seven drillpresses, all under 15 years old, released as a result of consolidation of two light-machining departments, were the nucleus for the new setup. Production from them so far outstripped that of previous units that steps had to be taken to keep them supplied. This resulted in the turret-lathe installation shown in photo at upper right. By using newer equipment, number of machines has been cut from 95 to 64, in 30,000 sq ft instead of the original 12,000. Modern methods, with high-speed tooling give better delivery dates by slashing machining time

repair parts for past models are shipped faster

how modernizes

Turrets at Work . . . Much of the work was done on ancient engine lathes, which even with high-speed tooling, were not capable of proper speeds and feeds. Three new J&L turret lathes, tooled with carbides, and modern machining methods, replaced 14 engine lathes averaging 30 years old. Remaining lathes were replaced by others from consolidated departments, as were old drillpresses and millers. Except for special machines, all equipment has been purchased or rebuilt within 15 years. Lighting was modernized at the same time floors were relaid, and the area cleaned up as well as the ancient multi-floor mill building permits

Electronic-Controlled Flame Cutting Cuts Time 70%, Grinding 75%



6A Oxygraph with four torches and electronic tracer control currently has paper templets for masters, but permanent drawings are being made for repetitive parts. Depending on quantity and size of parts being cut, 2, 3, or 4 torches are operated. Cutting with electronic control is 4 ipm faster than with manual

RECENT advances in automatic flame-cutting of steel prompted study and eventual purchase of a No. 6A Oxygraph with electronic tracer control. Refinements in tips and mixing chambers were found to make smooth finishes possible, while mechanization under electronic control provided extreme accuracy that cuts finishing to a bare minimum.

Application of the equipment is still in the development stage, but anticipated gains have been exceeded. Random studies on a variety of parts indicate:

1. Layout work with full scribing of pattern has been eliminated on some parts, with elimination likely on 80% of the rest.

2. Cutouts — small radii and shapes connected with a section to be burned—were formerly punched beforehand. They are now flame-cut at the same time.

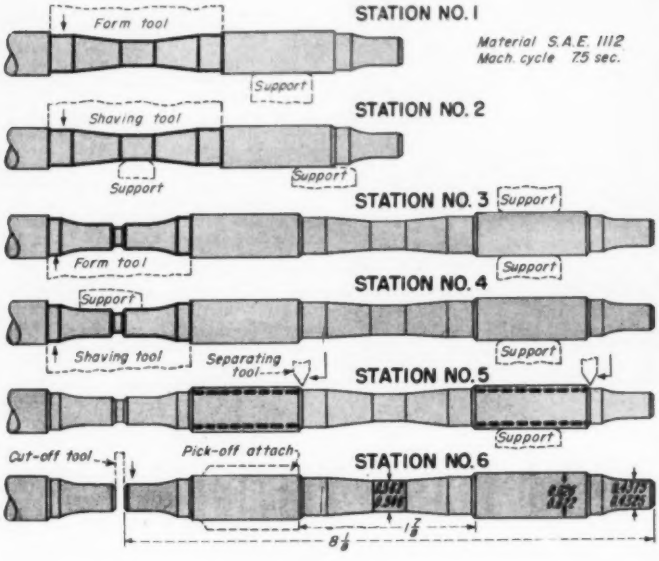
3. Multiple-torch operations cuts cutting time 70%. With electronic tracer, cuts are made about 4 ipm faster than with manual control.

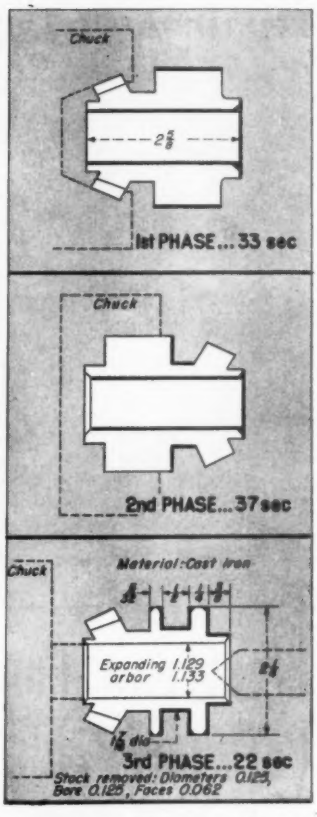
4. With automatic tracing, the operator can pay full attention to the torches, which in the case of wavy sheets may require some adjustments. Elimination of split attention reduces operator fatigue materially.

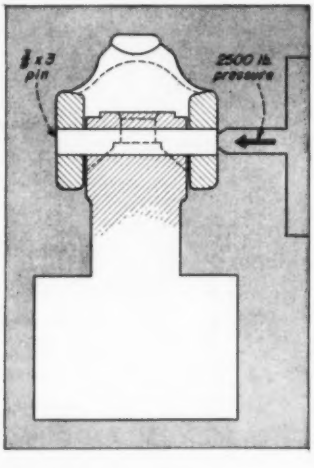
5. Finish grinding on shape-cut surfaces has been reduced 75%.

Multiple Savings . . .

follow planned modernization







AUTOMATIZED ASSEMBLY HALVES TIME

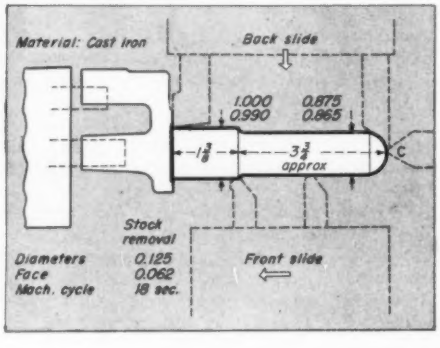
This bracket and pin were formally assembled manually in 0.7 min. They are now assembled in a hydraulic-cylinder fixture in 0.3 min per piece. The equipment paid for itself in 10 months

TOP-ROLL MACHINING TIME CUT 87.5%

A battery of basic and secondary-operation machines formerly performed 1 basic and 3 secondary operations in a total of 4 min per piece. Now three 6-spindle Cone automatic lathes do the job as one operation in 0.5 min. Time saved in direct labor alone paid for the equipment in 16 months. But purchase of new units saved rebuilding of 16 old machines, so repayment time is less than a year. Also floor space is saved

AUTOMATICS PAY OUT IN 13 MO

This CI bevel-gear blank, formerly turned on 11 single-operation machines 35 to 40 years old with 8 operators (1 basic, 5 secondary operations), is now made in the same volume on three Fay automatics handled by one operator at 322 fpm max. Time per piece is cut from 7.9 to 1.1 min mantime, floor space cut 600 sq ft, maintenance costs slashed, and scrap reduced enormously



SEVEN MACHINES SAVED ON TURNING

This CI spindle base required 9 machines, with 6 operators and 3 operations. It is now made on two Sundstrand Stub lathes with 1 operator in 1 operation. Mantime per piece is cut from 1.05 min to 0.35. Direct-labor savings alone paid for the machines in about 11 months. There is further saving in maintenance and in reduced space and scrap

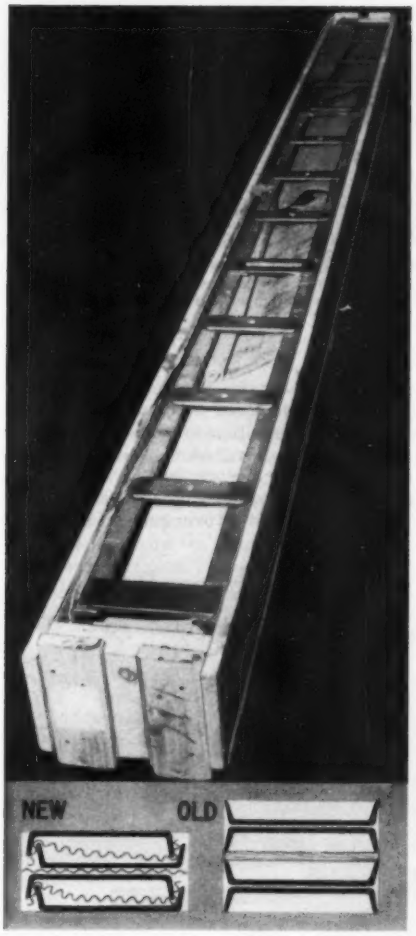
Packaging Increases Customer Satisfaction ...and saves money

how modernizes

PROPER packaging for export is essential. Methods of packing and preventing corrosion govern to a large extent condition of equipment when it arrives. Therefore, maximum handling and exposure to be encountered both en route and at the port of entry must be considered and corrective measures for utmost protection must be adopted.

Type of container; thickness of lumber employed; grade of paper lining; type and application of slushing oils and greases; fasteners, cleating, and strapping—all must be considered for each item packed. Further, the container must be carefully planned to be most economical of materials and costly shipping space, and it must be plainly marked for contents and destination.

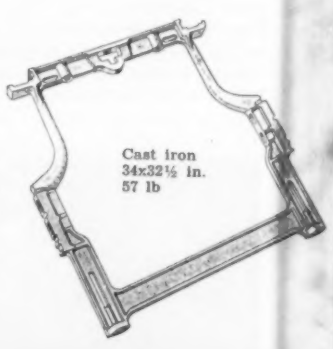
All these elements are familiar and academic — thus cause major waste for many companies. Saco-Lowell, through careful study of shipping, has cut container and shipping costs as much as 30%—with machinery in better condition upon arrival.

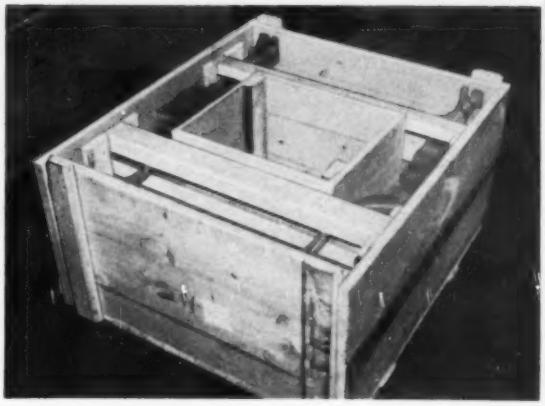


Annual Savings = $16,624 . . . Steel fabricated spindle rails (two 2½-in. angle irons 10 ft long with welded 7½x2x½-in. spacers) are one of the most important parts of the spinning frame, shipped in large quantities. Former box was 12 ft 1 in. long x 8⅝ x 12 in., with a capacity of 18.4 cu ft. The box was 1¼-in. matched lumber with outside battens. Rails were packed back to back, with a separator board between pairs.

The new box, 12 ft 1 in. x 9¼ x 7⅝ in. (above), capacity 9.8 cu ft, holds rails interlocked face to face, separated only with single-faced corrugated paper to protect paint. Savings: 35 board ft of lumber, 18 min labor per box, 8.8 cu ft shipping space

$6,249 Per Year Saved . . . Samsons (right) were formerly packed in shavings, with the center void also filled with shavings. Without changing the box, but by arranging the samsons differently, it has been possible to eliminate one box for every ten spinning frames shipped. Separators are placed between samsons to lock them in place and prevent one from hitting another. The central void is now filled with a wood "samson square" (below). Smaller parts—usually tape-tightener weights formerly shipped in a separate box—are packed there





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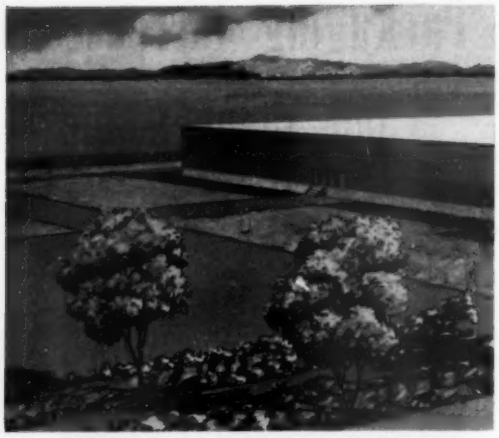
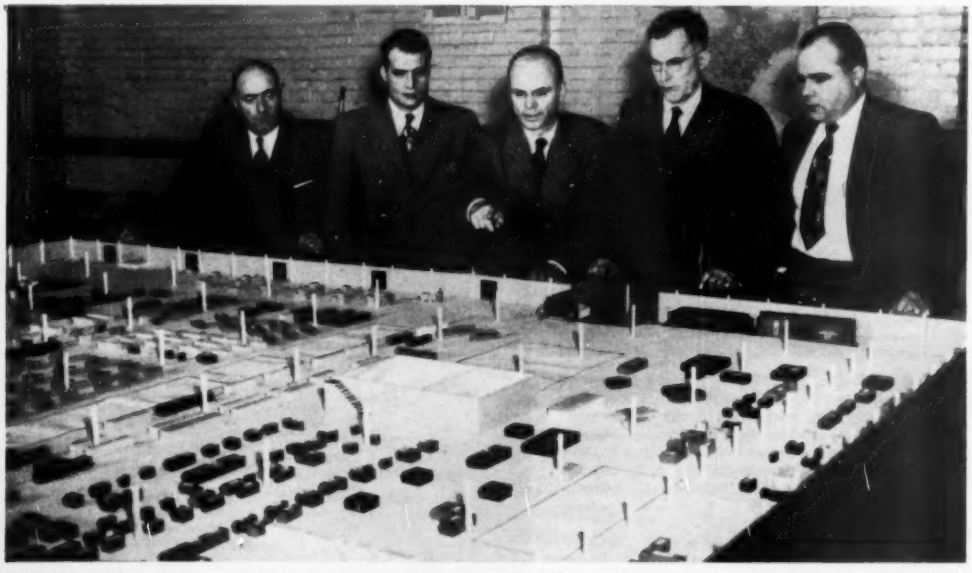
BUILDINGS ARE BEING REPLACED, TOO



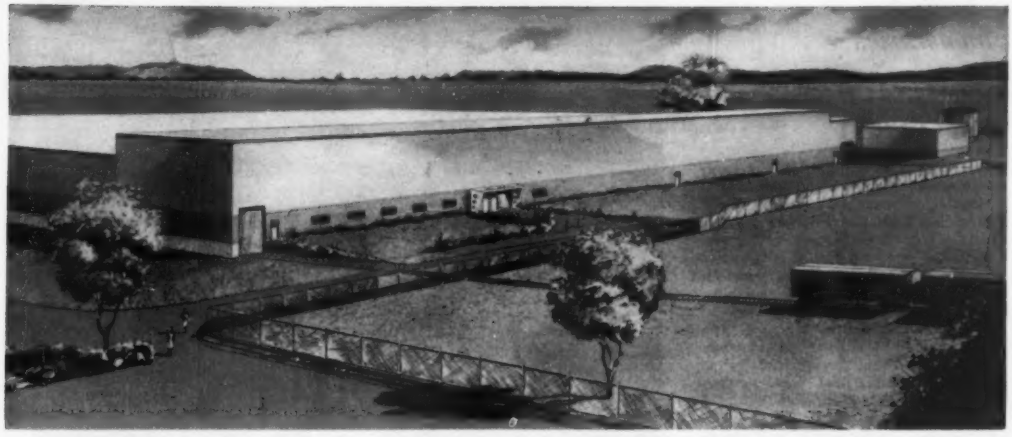
Windowless and without a basement, this new plant, designed by the Austin Company of Cleveland, is the first third of a possible million-sq ft plant. It provides inside

A POLICY error, made 100 years ago, has plagued Saco-Lowell for years. During the years 1844-1850, Saco Water Power Company didn't anticipate a future as a textile machinery builder, so it sold off its mill sites wholesale. Contracts with Laconia and Pepperell Mills condemned Saco-Lowell Shops to a cramped existence on a narrow half-moon of land on the banks of the Saco River.

Withdrawal from Newton, Mass., to Biddeford in 1931 resulted in occupancy of buildings on the other side of the Saco, which were built as multi-story cotton mills, hence are unsuited to heavy-machinery manufacture. In toto, about 1,400,000 sq ft are occupied in buildings, almost all over 30 years of age and



Receiving section of the new plant, showing trackage, undercover trailer docks, and the truck-unloading doors. **Left to right behind the model are: W. W. Wooldridge,** Mfg. Supt; W. B. Lund, asst to works mgr; Sven Vaule, works mgr; J. S. Chafee, executive vice-president; and M. C. Hutto, superintendent of Methods & Equipment



trackage of 120 ft on the receiving side and of 250 ft on the shipping side, plus truck dockage as well. Operations will be in product lines across the plant, but units will be zoned so raw-material storage, machining operations, painting, assembling, etc., can be handled by specialized foremen, each supervising a process rather than a product.

several over 100 years old. Further, any boom market overloads the present too-concentrated, inefficient structures—because the plant consolidation in 1928-32 reduced manufacturing capacity for obvious financial reasons.

In 1946, a plant to assemble pickers was set up at Thompson's Point, Near Portland, Me., and many other parts were sub-contracted. This gave flexibility, but at higher cost, so the Portland plant has been closed. In common with its competitors, Saco-Lowell also opened a southern plant. The plant of The Edwards Co., affiliated with the Indian Motorcycle Co., at Sanford, N. C., about 85,000 sq ft of buildings on a 22-acre site, was purchased in 1948 and turned over to manufacture of combers, drawing frames, card strippers, and lap winders—in the area where 80% of the company's present domestic sales are made. It now employs about 600 people, and is within 250 miles of 75% of the spindles of the South.

Thus the reduction in transportation and other costs, and easier service of southern customers from a southern plant, must be balanced against the cordial relations that have grown up between the company and the residents of the twin cities of Biddeford and Saco, and the unsurpassed market for skilled machinists and operators in New England (4100 people are presently employed at the Biddeford plant). It had long been recognized that manufacturing operations in Biddeford should eventually be housed in a completely modern building on one floor level, to make possible many economies that cannot be realized in the old multi-story buildings. The management felt that the time for decision had arrived. Should large sums be spent in Maine for a modern building, or spent elsewhere in acquiring new plant facilities?

Labor a Major Factor

It is no secret that a major factor in deciding what to do in such a situation is the attitude of labor —particularly of union heads. It is a striking testimonial to the cooperativeness of labor in Biddeford during the past four critical years that the company has decided to build the first unit of its rebuilding program in that area. A new site of 160 acres has been purchased in Saco within two miles of the present plant, and the first unit of the new single-floor building will be occupied this fall, materials permitting.

This 478x603-ft structure will be the center unit of what could be a 1-million-sq ft plant, all on one floor except the offices. Into this first unit will go operations requiring 700 employees, now carried on in the old mill buildings on the Saco side of the river. This first unit will cost $2,750,000 in round numbers, which with the site and moving means $3 million—but will save 15% on the investment in operating economies even in years of moderate volume.

The ultimate 1-million-sq ft plant is only two-thirds of the size of the present Biddeford-Saco operation, thus showing the economies of bringing all operations under one roof. Whether it will all be built in Saco, or in the South, will depend on labor and economic conditions.

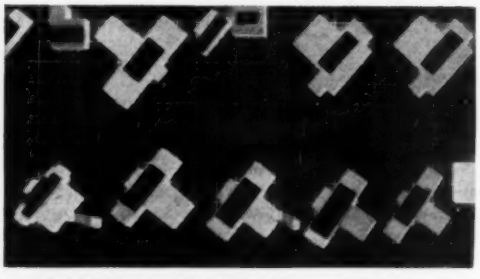
The new structure is described as a brick and steel combination, with brick walls going up 10 ft from the floor and corrugated asbestos above. The roof deck is precast composition slabs with high insulating properties, covered by pitch and slag water-proofing. It will be a windowless structure—except in the office area—with fluorescent lighting and forced-air ventilation and heating.

A separate power plant will be provided (far right in sketch — stack base only shown), capable of expansion to handle enlargement.

how **S** *modernizes*

PERMANENT MODELS GUIDE LAYOUT

Major manufacturing bays are each represented by a scale model in the Planning Department, made to a scale of ¼ in. to the foot, and gridded with 2-ft squares (½ in. on layout). Machines are either die-cast scale models or simply blocks of wood to scale and carrying identifying labels. In either case, they are colored to make identification by machine type easy; the code follows. All models show supporting posts and other building features and each is protected by a plastic cover snapped into rails at the edges, fitting over permanent acrylic-plastic end plates

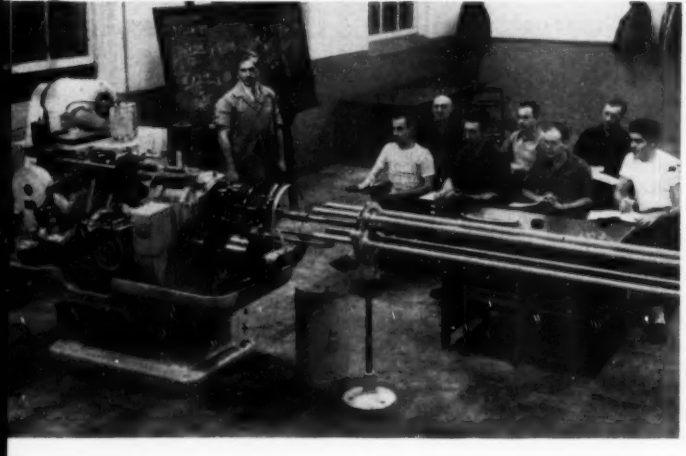


Completed layout is photostated for record and for moving crew. Note ½-in. squares, equal to 2 ft on plant floor

COLOR CODE FOR MODELS IN FLOOR LAYOUTS

Orange	**Materials-handling equipment**
Maroon	**Surface-finishing units (degreasers, painting units)**
Blue	**Lathes (engine, light; turret, medium; automatic, dark)**
Purple	**Gear cutters**
Light Green	**Drills**
Medium Green	**Millers**
Dark Green	**Planers, shapers, fluters**
Brown	**Grinders**
Yellow	**Cutting-off machines**
Dark Gray	**Incidental (benches, cabinets)**
Light Gray	**Arbor presses**
Black	**Sheet-metal fabricating units**

MACHINE OPERATORS' SCHOOL



Last Fall, evening-school programs were expanded to offer special "upgrading" training to operators of various types of automatic machines. W. W. Wooldridge, manufacturing superintendent, reports that the program is already being felt in manufacturing departments, and that results are exceeding anticipations. More than 200 operators asked to take the courses, offered for two hours, two nights a week, for each class, with qualified shop men as instructors. 80 men—eight classes of 10—are currently receiving instruction. Each instructor received a special refresher course before the school started, including a one-week visit to the plant of the tool builder.

To provide classrooms, four large rooms were built in a former machine bay, each equipped with 20 desk-arm chairs, instructor's desk, blackboard, and a machine tool ready to operate. Tools include a Potter & Johnston automatic turret lathe, a Bullard vertical turret lathe, a Jones & Lamson, ram-type turret lathe, and an Acme-Gridley 4-spindle automatic screw machine, and are not used for other work. In this photograph, R. Olimski, methods engineer, is giving classroom instruction on the Acme-Gridley automatic

We Must Pay As We Go

***We** must do our utmost to pay as we go for our present defense program.*

On that proposition those who speak with authority are remarkably well agreed. This editorial – the second in a series on our mobilization for freedom – sets forth in simple terms why there is this agreement.

Next year – the fiscal year beginning next July 1 – the federal government's budget calls for the expenditure of $10 billion more than is scheduled to be collected in taxes. The deficit is due to the increase in defense expenditures.

A part of this deficit can be eliminated by cutting non-essential expenditures and increasing efficiency in the defense program. There is wide agreement on this. It is the duty of the President and Congress to see that it is saved.

How the remaining deficit anticipated in the federal budget—$5 billion to $10 billion—is handled is crucial. The government can meet it by raising taxes—by paying as we go. Or it can borrow, issuing more government bonds.

Borrow Again?

We relied heavily on borrowing in both World War I and World War II. In World War I only about one-third of the expenditures of the federal government were met by taxation. In World War II about 45 percent were met in this way. The rest we borrowed. Some people ask, why can't we rely heavily on borrowing again? Why is it crucially important to avoid adding $5 billion to $10 billion to a federal debt that is already $257 billion?

Part of the answer is found in the contrast between this defense program and our all-out effort of World War II. Another part—and one that is all-important in combatting inflation—results from the rapid decline in the purchasing power of the American dollar in recent years.

We went "all out" in World War II. We put almost half of everything we produced into our military effort. Taxes high enough to pay the financial costs as incurred would have meant huge tax increases. It was feared that such increases would kill financial incentives to get "all out" production. Since we expected the war to be short, borrowing seemed a safe expedient. Price control and rationing, with wartime patriotism to give them effective support, were relied upon to keep in check the inflationary pressure created by borrowing rather than taxing.

Our present defense program is scheduled to take a much smaller share of our production, but to take it over a much longer period. At its peak, the program as now planned will take only about 20 percent of our total national production. But, to use General Bradley's phrase, "the conditions under which we labor may persist for ten, fifteen and twenty years."

What About Controls?

For a period of any such duration it would be foolhardy to expect that the sort of controls we had for the few years of World War II could hold in check the inflationary pressure created by not paying as we go. It would be as foolhardy as it would be for a family to plan on borrowing to pay the expenses of a member discovered to be afflicted by a chronic ailment which might last a long lifetime.

Obviously, the only safe thing to do in such a case would be to adjust the family budget so that the expenses of the illness would be paid currently.

Our heavy reliance on borrowing in World War II had consequences which block a successful repeat performance.

If the borrowing had been done by persuading individuals to transfer their savings into government bonds, relatively little inflationary pressure would have been created. What the government would have spent with the proceeds of such bond sales would have been subtracted from the money individual consumers could spend.

But most of the borrowing was done from banks. That course expanded the amount of money available to the government without any offsetting subtraction of money from the hands of individuals. Thus, when direct price controls were removed after the war, this bottled-up purchasing power contributed to a price inflation which has cut purchasing power of the American dollar about in half – and decidedly changed the attitudes of the American people toward that dollar.

During World War II, Americans in general believed that:

The war would not last long.

The dollar would hold its value, and even gain value after the war.

Many wonderful new products would be available in the postwar period.

Today the American people have:

Seen the value of their dollars melt away fast.

Been assured that, at best, we may have a 10-15-20-year pull ahead.

Been warned not to expect a postwar paradise anytime soon.

One result of these changed attitudes is a notable lack of enthusiasm for government bonds on the part of individual investors. This is indicated by the fact that since Korea redemptions of E bonds have exceeded sales by about $600 million. Another result is a continuing rush to convert dollars into physical goods and equipment or claims on them. This trend weighs against financing the prospective federal deficit by borrowing from individuals.

Borrowing from banks to meet the deficit would again add fuel to inflation.

The prospective deficit is due to federal expenditures for military goods. Even if they are not blown up or shipped abroad, these goods will not be available to civilians. But the money paid to those who produce military goods will still be available to bid up the prices of civilian goods. Thus, at a time when people show relatively little disposition to save dollars, a menacing inflationary pressure – an inflationary gap, the economists call it – will be created.

If our fight against inflation is to be successful this gap must be closed by taxes. We need to do other things, too, for inflation has many different causes. Credit expansion must be effectively controlled. Production of civilian goods must be increased as much as possible by eliminating waste and inefficiency. But a pay-as-we-go tax program is basic to a successful attack on inflation. And inflation – unless it is checked – could wreck our defense effort.

We cannot pay as we go merely by soaking harder the corporations and those in the upper income brackets.

As the President's Council of Economic Advisers has reported, "by far the largest part of the additional revenue must come from the middle and lower tax brackets. These are the brackets in which the great bulk of the income is located."

Taxes Can Attack Inflation

By spreading tax increases broadly, taking small amounts from many people, inflationary pressure would be effectively reduced. It is the expenditures of the great mass of people, rather than the small numbers in the upper income tax brackets, that create most of the pressure. Moreover, it is possible to increase taxes broadly without killing the economic incentives to produce. Maintaining these incentives is essential to the success of the defense effort.

Our elected representatives cannot be expected to be enthusiastic about a pay-as-we-go tax program. It involves increasing the taxes of the great body of their constituents, an operation completely lacking in political glamour. However, such a program also involves the integrity of the American dollar. And that is absolutely essential to the success of the defense program. We shall be very foolish if we do not let our leaders know that we want them to do everything possible to pay as we go.

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ROUND TABLE

Turnabout

"Look here, Al," fumed Ed, "When a shop foreman has to have an interview with a man whom Personnel passes for a job, that's where I draw the line."

"Don't tell me, Ed, that a job hunter wants to give you a checkup before he comes to work!"

"That's exactly the idea, Al; how'd you guess it?"

"I happened to be down in Personnel when the fellow asked if he could look over the foreman before making up his mind. I understand from Mueller that the fellow walked out when he was refused."

"Of all the unmitigated gall!" exploded Ed. "First thing I know they'll be giving me an aptitude test before they'll work for me!"

"Not work *for* you, my dear fellow—*with* you. What's wrong with a man wanting to know what sort of a character he has to deal with?"

"Hell's bells, man!" flared Ed. "Don't tell me you have gone red, too!"

"There's nothing red about it if you look at it in the sensible light. The guy is looking for a job in which he'll have to spend most of his waking hours; so why shouldn't he be privileged to look into the type of man from whom he'll have to take orders throughout the day? We don't hesitate in checking up on a worker as he comes here looking for work, so why shouldn't the worker do a little checking up himself—get the big idea?"

"I certainly do not," returned Ed emphatically. "A foreman isn't much if he has to go on exhibit like a prize pig. If he doesn't know how to handle men, he won't be a foreman long."

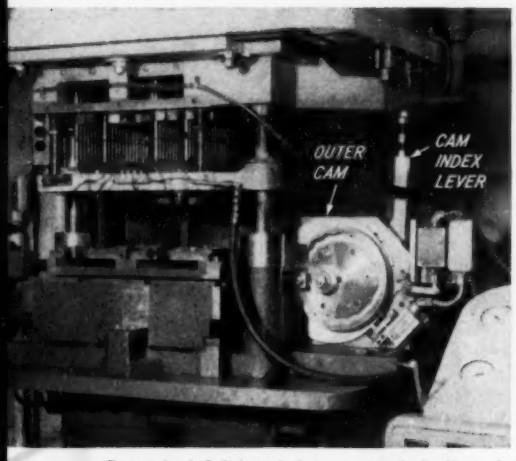
"Don't be too sure, Ed. Some of the old-time foremen were just tough guys and that's all. But, beyond that, why should a smart guy start to work for a foreman he knows in advance he'll never get along with? Personality conflicts can happen there just as much as between men."

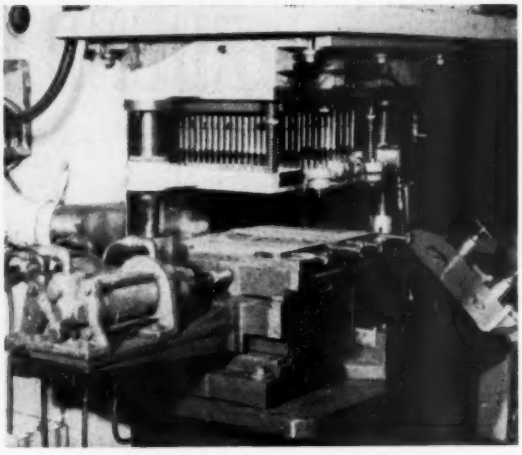
"Well, maybe so, but the man ought to expect that possibility. If he just keeps his mouth shut and does his best, he'll get along."

"Not necessarily, Ed. After all, if it's smart to check men before you put 'em in a gang together, it should be just as smart to check the foreman. There's a lot to psychological testing, I think."

"Maybe we need to hire one of those guys with the couch to dig out everybody's hidden desires, and put him in the Employment Office! We may as well go whole hog, Al!"

WHAT ABOUT FOREMAN PSYCHOLOGY? *Is it practical for the new worker to look over his possible boss? Or is that going too far, as Ed believes? Your ideas and opinions on this subject will interest others. Discussions of earlier topics appear on later pages.*





Cam-actuated fixture indexes successively through 22 positions beneath drillhead. At each position, head feeds automatically to drill 68 holes. Track cam moves fixture back and forth across machine table by link connected directly to fixture and cam is indexed by travel of drillhead. Air cylinder at left cushions index motions of fixture and second cylinder (partially visible behind cylinder in foreground) controls in-and-out motion of fixture through Micro-switch actuated by second cam surface on master cam

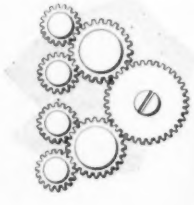
292,200 Holes Per Shift Per Machine

BY MILES J. ROWAN, ASSOCIATE EDITOR

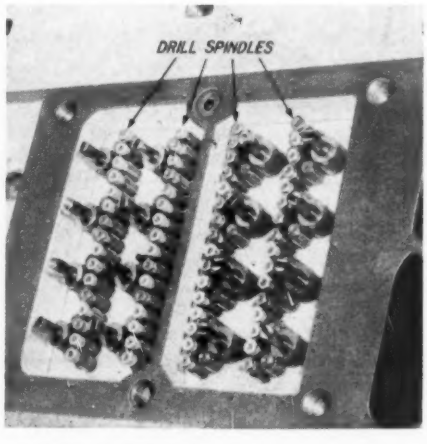
IN LESS than two minutes, 1496 holes are drilled in ⅜-in. thick Bakelite panels at IBM's Endicott plant. This is done in a cam-actuated fixture in a multiple-spindle drilling machine. Designed by IBM engineers for control panels on all business machines with card circuits, the setup eliminates all manual effort during the drilling operation. Once started, the operating cycle is fully automatic, with drillhead and fixture motions closely synchronized through Micro-switches and relays.

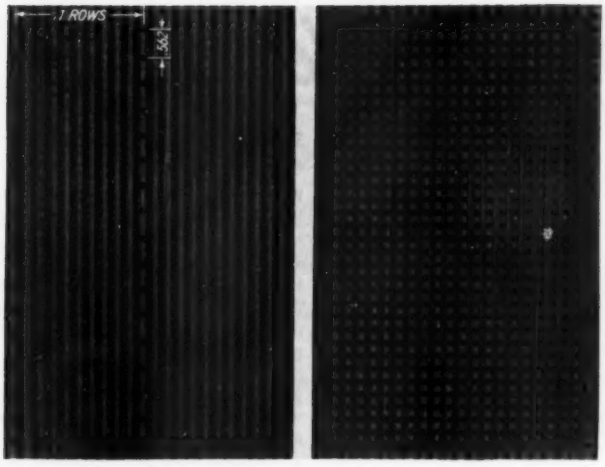
The fixture holds two panels, each of which requires 748 holes. The drillhead, which is a special design that permits the close center-to-center spacing, has four rows of drills with 17 drills in each row. When the drillhead clears the work after one pass, the fixture indexes one position to the left and the head descends again. This continues until the fixture moves through 11 positions. The fixture then moves inward in one position toward the machine column. Motion from left to right then begins, with the fixture again passing through 11 positions so the holes produced in this series of passes are in alignment with those previously drilled.

The lateral motion of the fixture is produced by a track cam at the right of the fixture. As the drillhead descends, a cam index lever attached to the head advances one position on a ratchet connected to the cam. As the head rises and the drills clear the fixture, the lever indexes the cam to the next



Drillhead is aluminum casting. Driving through intermediate gears permits center-to-center distance of 0.562 in. Drillhead for 22-row panel has 4 rows of 17 spindles each—one more spindle per row than in drillhead shown





Control panels for IBM machines are placed in fixture two at a time in position shown. Panel at left shows holes produced in one panel at first pass; pattern is repeated in successive indexes until panel is complete, right

Cam-actuated fixture speeds multi-hole drilling. Advanced tooling gives high production, high quality, and an easy job to run

position. The corresponding movement of the fixture is cushioned by an air cylinder that acts continuously in a direction opposite to that of the fixture travel. After the 11th index, the outer surface of the cam trips a Micro-switch to actuate a second air cylinder that moves the fixture to its inner position. This switch also controls the air flow to the first cylinder, reversing the flow as the direction of fixture travel reverses. The length of the drilling stroke and the feed rate are controlled by dogs set to trip levers on the slide at a predetermined point as the head advances and returns.

The fixture location provided by the cam is nearly correct, but final positioning is by four round-nose pilots on the bushing plate. These engage holes in the fixture to give positive location. Work is located in the fixture by rear and left-side locating blocks. Four swivel end clamps operated by hand knobs clamp both boards against locators. As the head rises after the final drilling pass, a second limit switch automatically stops the rotation of the drills so work handling can be done without danger of injury. Drills will not start again until the operator pushes the cycle start button. The operator also can stop the feed at any point with a control lever next to the control panel.

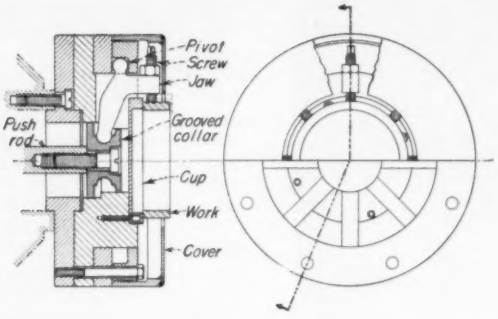
Holes in the panel are 0.139 + 0.0015 — 0.000 in. The total tolerance on the center-to-center distance between holes at opposite ends of a row is ± 0.007 in. Hole size is checked by plug gage and hole location by height gage.

Drills are 3.6-mm, slow-spiral, HSS and are ground by hand at the machine to approximate 60° included angle. On the average, around 3000 panels are obtained per grind.

At present, two of these setups are in operation at Endicott. Three panels are drilled in this way with one requiring both drilling and countersinking. Changeover to a different job requires changing the drillhead, fixture, and cam, as the panels differ in number, size, and spacing of holes. Introduction of this method eliminated a tremendous amount of manual effort formerly required to hand-position fixtures and to trip the head for each pass. Production increased 100% and the number of machines required for this work was halved. In addition, considerable savings in floor space were realized.

"Say, where the devil are the controls on this all-enclosed model?"

Practical Ideas



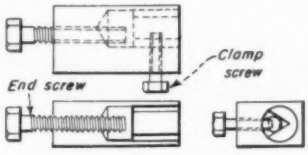
Eight-Jaw Ring Chuck Has Speedy Uniform Action

STANDARD 3-JAW CHUCKS deform light ring work when it is clamped, causing non-round turning cuts to be made. For thin, light pieces and pieces made of light metals, an 8-jaw chuck may do the clamping much better.

The chuck was made in our factory, and has been installed on a number of lathes for various jobs. In three years, it has proved its value and efficiency.

The chuck is made up of hardened steel parts. Each jaw carries a dog-head setscrew that has a rounded tip and is locked with a jam nut. The jaws pivot in the main part of the chuck and are operated by a grooved collar that connects through the lathe headstock to an air cylinder. As the cylinder pushes forward, the jaw screws release the work, and as it retracts the screws grip the work. Because of its air operation, movement of the chuck is fast.

For each run, a sample workpiece is chucked and the screws are adjusted to clamp it on center. For this part of the setup the front chuck cover is removed. The screws allow considerable adjustment for different diameters. For different jobs, a backup cup may be replaced to position the work from behind. Because of this cup, and because the chuck is quick-acting, work can be replaced while the machine is running. Work that varies as much as ⅛ on the diameter can be chucked dead on center with this chuck design, which is quite an advantage over normal chucks. *Francisco Corti. Buenos Aires, Argentina.*



Carbide-Bit Holder Grips Rounds and Triangles

HAVING SOME trouble with setups where carbide bits were being used as cutting tools, we took a piece of 3 x 1½ x 1-in. stock, reamed a ¾-in. blind hole into it the long way, notched a V in a piece of round stock to fit in the hole, and attached two setscrews for clamping and adjustment.

The clamping setscrew holds a round or triangular bit in the V-bar, and also holds the V-bar in the holder. The end screw provides for lengthwise adjustment. This holder can be clamped in a regular lathe toolblock, or can be made to fit a standard lathe toolpost. *John H. Forsgren, Lakewood, O.*

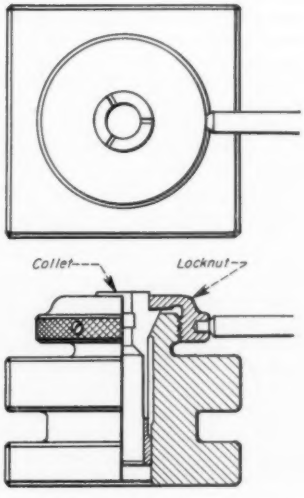
Stubby Collet Attachment Mounts on Machine Table

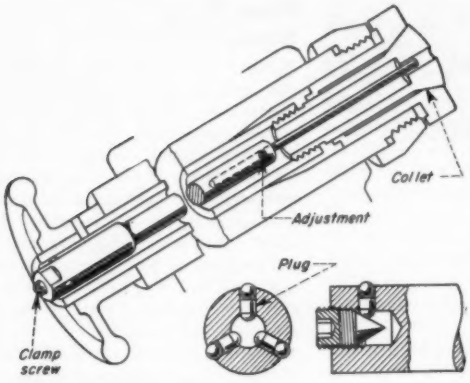
FOR VERTICAL SETUPS where broaches, punches, drills, and such tools must be ground to provide square ends, this attachment can be clamped speedily to a machine table. The same design will mount on a miller or on a lathe slide for specialized cutting.

Although the illustration shows a square base, the base can be made with as many as 12 sides so the attachment can be locked against a stationary bar on the table, released, and indexed around. This allows cutting triangular, square, or hexagonal shapes on the work.

A deep groove is cut around the base to allow clamping, and a couple of holes can be drilled in the bottom of the base for attaching a T-nut, which would fit the slots in a table. The collets are keyed into the main hole and are closed by revolving the lock rod and nut. Regular screw-machine collets are recommended so standard shafts can be gripped.

The attachment is built small so it can be located flat or on its side for the maximum number of different setups. *Fritz L. Keller, Bloomfield, N. J.*





Collet Stop Backs Second-Operation Turnings

THREE RADIAL HOLES are drilled in the rear collar of this stock stop to take plugs and bearing balls which clamp in the collet-controlling tube. Minor adjustments of the stop are made with these, while major adjustments are made by adjusting the extension rod of the stop.

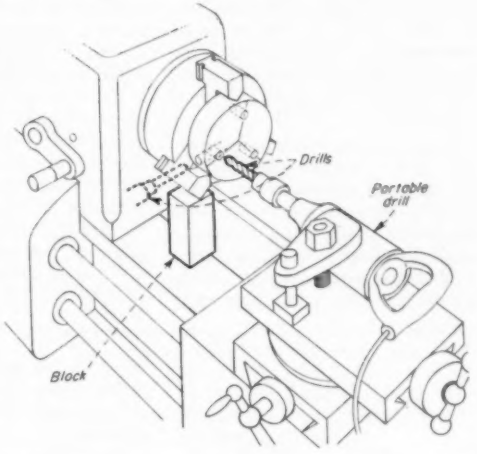
The plugs are made with half-sphere ends (or have half balls soldered to them) so a conical-point setscrew that works in the tapped axial hole can spread them. To confine the balls after they are assembled, the ends of the holes are peened.

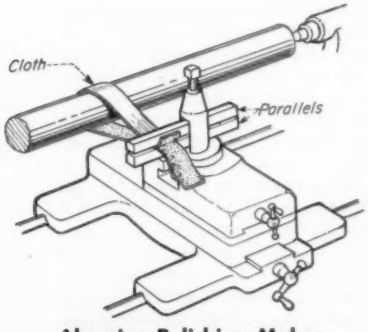
A hole is drilled several inches deep in the heavier rod to take an extension rod that is clamped with a setscrew. The extension fits inside the collet to prevent work from being inserted too deeply. *Charles H. Willey, Penacook, N. H.*

Chucks Do Simple Dividing Work

FOR ANGLE SETUPS where a dividing head might normally be required, but where the angles are multiples of 90° or 120°, an easy setup can be made by utilizing an ordinary lathe chuck. A four-jaw chuck can be indexed to 90°, 180°, 270°, and 360°; while a three-jaw chuck can be indexed to 120°, 240°, and 360°. If a six-jaw chuck is available, you can get any multiple of 60°.

We use the illustrated setup for drilling holes at these simple angles away from each other. The portable electric drill can be clamped on the slide, or can be mounted at the front of the lathe. *Robert Laimbock, Innsbruck, Austria.*





Abrasive Polishing Makes Rust-Resistant Surface

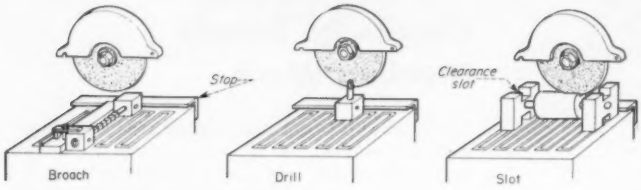
HERE IS a way to impart a uniform and alsting polish to shafts, spindles, and other round items.

A length of 2-in.-wide abrasive cloth (80 grit) is passed around the work and secured between two parallels clamped in the lathe toolholder. It is important that the parallels be adjusted square for an even pull to avoid tearing the cloth. Allow 6 to 8 in. between the work and parallels.

The work is well oiled and the half-nut on the leadscrew is engaged for a fairly fast traverse—about 4 tpi. On the reverse traverse, increase tension by pulling back the slide as much as possible and reduce the speed to about 0.020 in. per rev. Operate the lathe at high speed for both traverses.

The fast first trip keeps the fresh abrasive from removing stock and makes it possible for the abrasive to cover the work before loading up with rust. The return trip under tension leaves a mark-free surface slightly impregnated with oil that is consequently more resistant to rust and stain than surfaces polished by ordinary methods. *M. McElwain, Rensselaer, N. Y.*

EXPERIMENTAL CASTINGS can be machined to make a datum face for subsequent location and processing by casting them in a box of plaster of paris. For one-of-a-kind jobs, this can save much time lost in elaborate setups. The casting is located so the datum face is just above the plaster. *R. W. Pile, Surrey, England.*



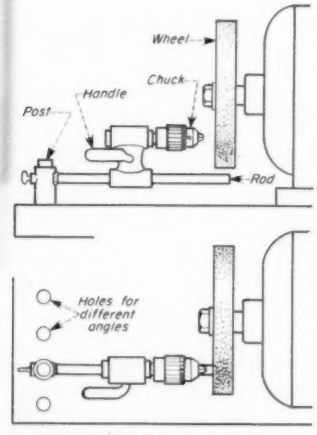
Grinder Setup Blocks Hold Odd Parts

FOR SMALL, round work that must be ground, and which is usually difficult to locate on the flat magnetic table of a surface grinder, these setup blocks do adequate locating and gripping. The best way to make them is with a large, standard-size hole through the middle to take bushings which will adapt them for many sizes of round parts.

Three sample setups are shown. The first is for holding a broach that is being ground square to cut a boring-bar hole. Magnetism holds the blocks down, but a clamp insures that they will not tip during a grinding pass. In this setup, where the work is unsupported in the middle, only light passes can be taken.

The second setup is for grinding the square shank on a tool. Here the block is flat on its side and there is no need for a clamp. The block is pushed against a bar on the table which acts as a stop; the block can be indexed for four cuts.

The third setup is for grinding a slot through a roll. So the wheel can make a full pass, the setup blocks are notched. Similar blocks can be made with 5, 6, or 8 sides, although 12 or more sides are not too practical because the magnetic effect of the table is reduced on small sides. *Fritz L. Keller, Bloomfield, N. J.*



Swivel Attachment Supports Bench Work

BENCH OPERATIONS like buffing, light grinding, and polishing are done readily with this table attachment. It can be mounted next to a floor-stand grinder, or on a table that supports a standard two-wheel grinder.

A pivoting support anchors the attachment to the table through a hole, a number of which are drilled to allow for different angles. Work is chucked in a Jacobs chuck that mounts on a hollow-spindle holder. The holder rides freely on the long rod, and is controlled and held by the operator by means of the handle.

The rod is welded to the collar, and the post is clamped inside the collar to allow slipping the rod into a hole so it can pivot. Angle adjustments are made by shifting the pivot to other holes. If desired, a swivel can be built into the holder, although this is not essential. The collar is made so it will swing the long rod just under the grinding wheel to clear it. *George F. Burnley, Oakland, Calif.*

Plastic Piping Guides Coolant

WHEN YOU WANT to add a coolant pipe quickly to a machine, and to locate it at just the right angle, it means connecting flexible pipe, soldering joints, adding swivel joints, and then rearranging everything all over again to clear moving parts of the machine. It takes a lot of messing around to get everything just right, and by that time the lot of parts has probably been finished if you are operating the machine at the same time.

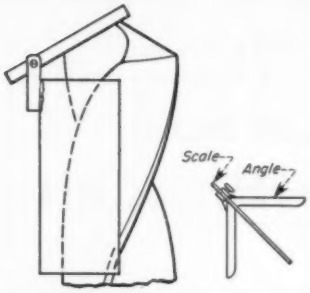
There's an easier way to do this: We take plastic tubing that comes in flattened and coiled lots and use that instead of any regular piping. The plastic is quite flexible, inexpensive, and water-tight.

We started off by tying a string to the end of the tubing to swing it over the spot we wanted cooled; but that left a flabby piece of tubing to dangle around and get in the way.

By taking a length of ⅛-in. soft-iron wire and jamming it down the length of tubing, we can twist and adjust the tube easily to the best position; and it stays there. We can just crimp the wire across the width of the tubing at its connection to the coolant pump, or we can take the end of the wire, wrap it roughly around a ⅜-in. rod to form a coil, and jam that down into the end of the tube.

For those cases where the tooling on a machine is moving all the time, it is easy to insert a real spring into the tubing after pulling one end of it out into a straight ling. The straight end is crimped or attached to the point, or close to the point, we want lubricated, so the tubing, being flexible, is shifted each time the machine slide moves. We avoid sharp bends that might later break.

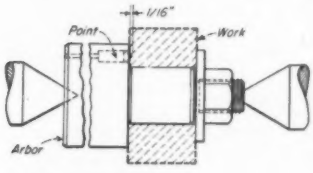
This isn't a cure-all for coolant problems, but it is effective. We have such coolant lines on a bulldozer, an automatic chucker, drills, and a turret lathe; we even have three of them on some machines, just to make sure coolant flows to the tool at all times. *N. Palmer, Paddington, Australia.*



V-Plate Gage Checks Drill Angles

DRILL-POINT ANGLES are gaged when hand grinding or checking is being done with this V-shaped gage. This replaces a standard drill-point gage for large drills where the flute gaps are large.

The V-plate has a small split clamp welded to its end, and this grips a scale which can be adjusted to any angle. *Donald E. Wood, Allegan, Mich.*



Chisel-Point Driver Dogs Centered Work

WHEN SECOND-OPERATION WORK has to be mounted between centers and does not have a surface by which it can be driven, this method works well.

The arbor itself is driven by a dog from the headstock, and a small, hardened point in the driver digs into the back surface of the work to drive it. The work is pushed onto the arbor and pressed firmly to make the point cut into it slightly. The point can extend from the surface of the arbor about 1/16 in. or less. The nut on the threaded end of the arbor only has to be tightened enough to make sure the point has dug into the work. The point is located in a counterbored hole. *Irving Mansfield, New York, N. Y.*

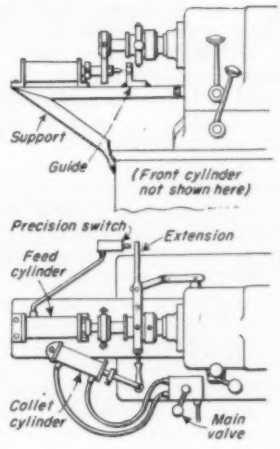
Pneumatic Mechanism Works Manual Collet Closer

A REGULAR COLLET LATHE with a manual collet closer can be fitted for semi-automatic operation by adding a couple of air cylinders. This arrangement was made on a Hardinge turret lathe, but could be applied to other makes.

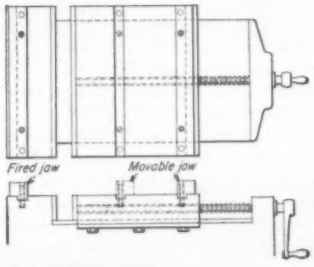
An angle-iron extension was added to the lathe head to support the mechanism. One end of an air cylinder pivots on a pin on this extension while the other end—or piston end—is attached to the collet-closer lever. This cylinder is controlled by a two-way air valve mounted on the front of the lathe.

A second cylinder is mounted on the extension to operate the stock-feed tube and fingers. This cylinder moves a double collar that is attached to the feed mechanism. The cylinder is a spring-return, single-acting type, and is mounted below the feed tube to clear stock being used. An air valve is mounted behind the lathe head. This is operated to power the feed cylinder when an extension on the collet-closer lever is moved to the left by the double-acting cylinder.

Operation is simple. The main valve is moved to "Open" position, the collet-closer cylinder pulls to open the collet and the extension on the lever trips the second valve



when the collet is open, the feed cylinder advances the stock, the collet is closed by returning the valve lever to "closed" position, and the spring returns the stock-feeding fingers. The collet closes on the stock before the fingers return because of a quick-exhaust valve. Stock is held in the forward position because this valve closes the collet before the spring can return the feed fingers to their original position. *Gustav Hirsch, Naharia, Israel.*



Extra Vise Jaws Grip Larger Pieces

MOST MACHINE VISES are equipped with long moving jaws into which the vise screw retracts as the vise is opened. It is possible to extend the range of lengths that can be clamped in such a vise by adding a couple of small auxiliary jaws to the top of the vise.

Slots are cut across both the fixed and movable jaws to take inserts. These inserts should be doweled and screwed firmly into place. On the moving jaw, a pair of slots can be provided to take the extra jaw either close or away from the edge of the regular jaw face.

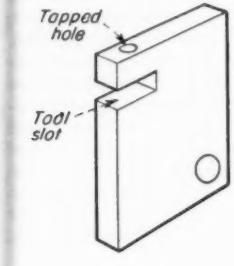
The new jaws should be made to an L-shape, so the rear projection of each can bear on the top of the regular vise jaws—thus preventing tipping. *Clarence B. Winch, Tonawanda, N. Y.*

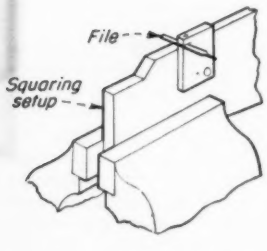
Squaring Block Does Odd Die Jobs

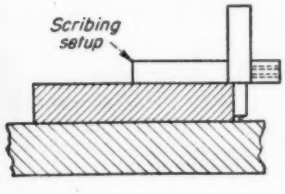
IN THE FABRICATION of press tools, templets play an important part. It is usually necessary to have squared edges on these templets, but the old method of using a square and filing to shape by eye is laborious. I have used this little squaring block for years in such cases with excellent results.

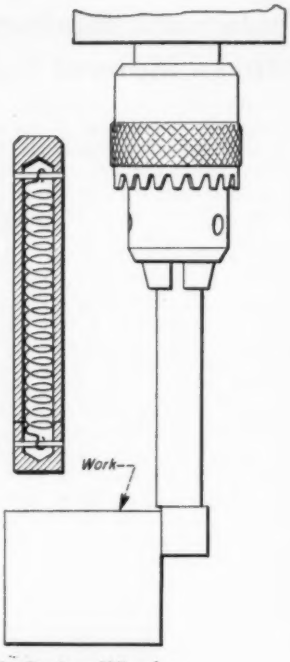
To square the edges of a templet, I grip a flat file in the slot by means of a setscrew. Now the block can be moved along the flat side of a templet to file the edge accurately and easily.

The same block gives good service as a marking device, with a scriber of some sort gripped in the slot. The flat of the block can be laid on the plate being duplicated, and the scriber can be drawn along the edge. *Douglas W. Turpin, London, England.*









Jig-Boring Wiggler Locates Spindle

LATHE WIGGLERS are common enough, but here is one that seems slightly different from the normal kind. This one is for a vertical spindle, as on a jig borer.

There are only five simple parts; a spring, two pins, a bored body, and a bored cap. The body and cap can be turned accurately at the same time, then parted and drilled carefully. The spring has moderate tension, and is hooked onto the pins at either end. The device is made of tool steel and is hardened and ground.

Here's how to use it: Chuck the wiggler in the machine, run the spindle at a fair speed, move the work against it to offset the cap slightly, then move the work back (by moving the table) so the cap just runs flush with the body all around. The operator can check to see that the cap and body are flush by touch. We have lined up jobs within a tenth by this method. *Fred H. Lingenfelder, Milwaukee, Wis.*

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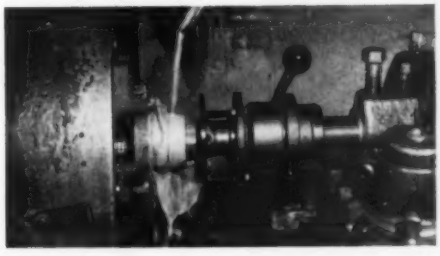

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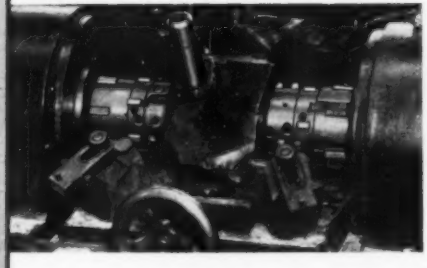

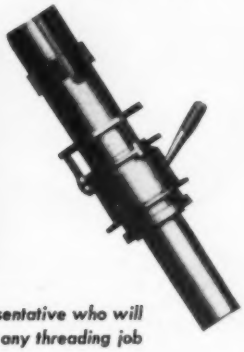

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American Machinist

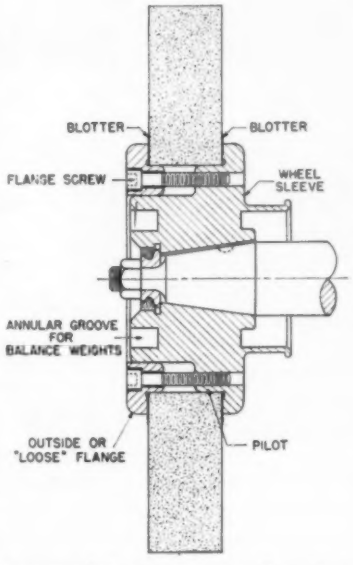
REFERENCE BOOK SHEET

Mounting Wheel Sleeves on Grinders

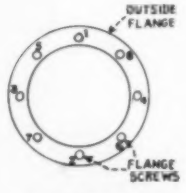
A recommendation of the Safety Committee, Grinding Wheel Institute

According to the American Standard Safety Code for grinding wheels, a wheel sleeve is defined as: "a form of flange used on precision grinding machines where the wheel hole is larger than the machine arbor. Usually the sleeve type of mount is so designed that the wheel, the sleeve and the flange can be assembled as a unit, for convenience in changing wheels."

Statistics indicate that more sleeve-mounted grinding wheels are broken by springing of the flange than from any other cause. Because springing arises from excessive tightening of the flange screws, the Committee prepared specifications for wrench pull to use when mounting wheels on grinders made by Brown & Sharpe, Cincinnati Milling, Landis Tool and Norton. These recommendations apply to sleeve-mounted wheels 30 in. in dia and smaller and up to 4-in. thickness, as used on the above makes of plain cylindrical, crankshaft and cam grinders. And the data may be used as a guide for other makes and types within the size range indicated, where basic design of the wheel sleeve is similar.



Recommended wrench pull applies only to this type of wheel sleeve mounting



Order of Tightening
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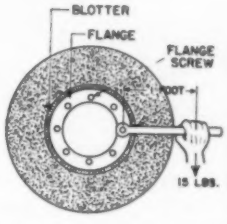


A torque wrench is best means of determining wrench pull

Procedure — Use new clean blotters each time a wheel is mounted. Tighten the wheel flange screws with torque of 15 lb.-ft. A torque wrench is a satisfactory means of obtaining the correct pull. Tighten one screw lightly, then go to the diametrically opposite screw and tighten a similar amount. Next tighten those screws midway between and continue the criss-cross pattern until all screws are tightened slightly. Finally tighten each screw to recommended wrench pull in the same sequence. Do not set up each screw the first time around, because the wheel will probably be damaged if the flange is not drawn down evenly.

Retightening—After 8 to 16 hr of grinding service, it is recommended that screws be checked for looseness by compression of blotters, and retightened if necessary. It is not necessary to remove the wheel and wheel sleeve from the machine for this step.

Exceptions — No research has been conducted on the types of mounts and sizes of wheels described below:

On jobs using wheels larger than 30 in. dia by 4 in. thick, where the rate of stock removal is high, the torque reading may exceed 15 lb-ft to prevent slipping. Increase the torque in small increments until slippage is overcome, check flanges for springing. If they are sprung, procure more rigid flanges.

Wheels used for crush dressing may require more than the specified mounting torque to prevent slippage or shifting due to the heavy radial pressure encountered. It may be necessary to procure special heavy flanges.

Centerless grinders usually have flanges designed to resist tightening pressures up to 40 lb-ft.

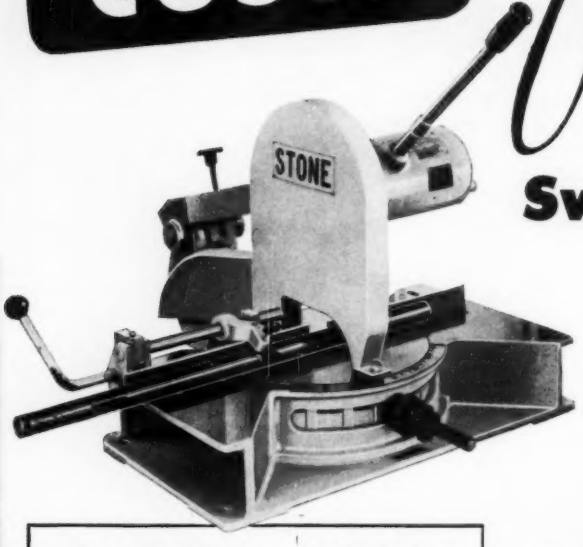
The foregoing recommendation of 15 lb-ft wrench pull applies only to the type of mounting illustrated.

Condition of Screw Threads — Condition and fit of the screw threads can affect the reading of a torque wrench by 25% or more. If the screws must be seated with measurable torque on the wrench, add this amount to the 15 lb-ft recommended when drawing up the screws tight.

CUT COSTS BY CUTTING *faster*

With a

STONE Swing-Cut M14



A Low-Cost Metal Cut-Off Machine That Performs Production Cutting Of Ferrous and Non-Ferrous Solids Up to 1½"—Pipe and Structurals Up to 2½" At the Rate of—

4 SECONDS PER SQUARE INCH

And May Be Used For Miscellaneous Cutting of 2" Solids (15 seconds).

Swing-Cut M14 asks little — gives a lot! Available at a lower price than any other machine of its capacity, this rugged little brute requires only 9 square feet of bench space to perform fast, clean, low-cost abrasive cutting. Engineered with positive drive without the use of belts (an exclusive Stone feature), the Swing-Cut M14 full 3½ h.p. geared-in-head motor delivers maximum constant power — increasing cutting speed, affording greatest efficiency and insuring longer wheel life.

Swing-Cut M14 Speeds Up Cutting Operations—Prevents Bottlenecks

- cuts faster, cleaner with positive drive
- swivels up to 45° in either direction
- 32" x 34" bench model — app. weight 300 lbs.
- designed for flexibility — easy, safe operation

CUTTING DATA

Material	Size	Time per Cut
COLD ROLLED STEEL — Bar Stock	1" x 1¼"	7.3 sec.
HIGH SPEED STEEL — Bar Stock	1" x 1"	4.8 sec.
PIPE — Heavy Steel	2⅛" O.D.—¼" Wall	10 sec.
TUBING — Stainless Steel	1¼" O.D.—⅛" Wall	1.75 sec.
STRUCTURAL — Angle Iron	2" x 2" x ¼"	5 sec.
ALUMINUM — Bar Stock	1" x 1½"	3 sec.
BRASS — Pipe	1½" O.D.	3 sec.
COPPER — Bar Stock	1" x 1¼"	5 sec.

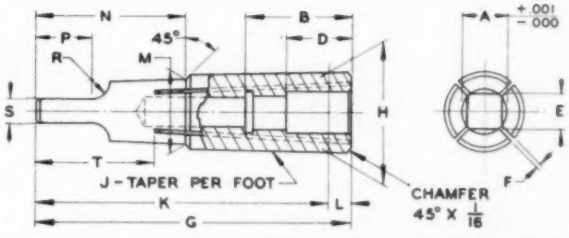
Write for Further Information

STONE MACHINERY CO., INC.

306 Fayette St. Manlius, N. Y.

Tap Drivers (FOUR-WAY-SPLIT TYPE)

The automotive industry is using these tap drivers directly in machine spindles, or in conjunction with extension sockets, or with floating tap-driver holders. Minimum of the tolerance on *A* is the nominal size; the maximum is nominal size plus 0.001 in. For hole *A*, concentricity with the shank is ground within 0.002 in. total indicator reading as gaged at a distance equal to the projection of a standard tap from the chuck. The hardness shall be Rockwell C48 to C50.



TAPER NUMBER	G	H	J	K	L	M	N	P	R	S	T
1	2-5/8	.475	.59858	2-7/16	3/16	3/8	1	7/16	3/8	13/64	1-11/32
2	3-3/16	.700	.59941	2-15/16	1/4	39/64	1-3/16	9/16	3/8	1/4	1-9/16
3	3-15/16	.938	.60235	3-11/16	1/4	13/16	1-3/8	11/16	7/16	5/16	1-7/8
4	5	1.231	.62326	4-5/8	3/8	1-1/16	1-3/4	3/4	7/16	15/32	2-3/8
5	6-5/16	1.748	.63151	5-7/8	7/16	1-9/16	2-1/8	7/8	1/2	5/8	3-1/16

MACHINE TAP DRIVERS

TAP SIZE	TAPER NUMBER	A	B	D	E MIN.	E MAX.	F
#0-80 to #6-40 incl.	1	.141	.7125	9/16	.114	.118	3/64
#8-32 and #8-36	1	.168	.8250	5/8	.139	.143	1/16
#10-24 and #10-32	1	.194	.8875	11/16	.160	.164	1/16
#12-24 and #12-28	1	.220	.9125	11/16	.173	.177	1/16
#14-20 and #14-24	1	.247	.9750	3/4	.193	.197	1/16

HAND TAP DRIVERS

TAP SIZE	STANDARD TAPER NUMBER	OPTIONAL TAPER NUMBER	A	B	D	E MIN.	E MAX.	F
1/4	2	1	.225	.975	3/4	.199	.203	1/16
5/16	2	1	.318	1.000	3/4	.246	.250	1/16
3/8 Small Shank	2	1	.375	1.050	3/4	.214	.218	1/16
3/8 Large Shank	2		.381	1.050	3/4	.298	.304	1/16
7/16	2		.323	1.075	3/4	.250	.254	1/16
1/2	2	3	.367	1.100	3/4	.283	.287	1/16
14 mm-1.25, 9/16	2	3	.429	1.275	7/8	.334	.340	1/16
5/8	3	2	.480	1.450	1	.372	.378	1/16
18 mm-1.5, 11/16	3	2	.542	1.5625	1-1/16	.419	.425	1/16
3/4	3	4	.590	1.800	1-1/4	.454	.460	1/16
7/8	4	3	.697	1.9125	1-5/16	.535	.541	1/16
1	4		.800	2.025	1-3/8	.612	.618	3/32
1-1/8	4	5	.896	2.1375	1-7/16	.688	.696	3/32
1-1/4	5		1.021	2.300	1-1/2	.782	.790	3/32
1-3/8	5		1.108	2.350	1-1/2	.847	.855	3/32
1-7/2	5		1.233	2.400	1-1/2	.941	.949	3/32
1-3/4	5		1.430	2.375	1-3/8	1.088	1.096	3/32

STRAIGHT PIPE AND TAPER PIPE TAP DRIVERS

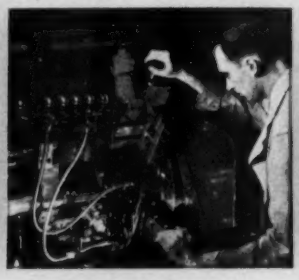
TAP SIZE	TAPER NUMBER	A	B	D	E MIN.	E MAX.	F
1/16, 1/8 Small Shank	2	.3125	1	11/16	.240	.244	1/16
1/8 Large Shank	2	.4375	1	11/16	.335	.341	1/16
1/4	3	.5625	1-1/8	3/4	.430	.436	1/16
3/8	4	.7000	1-1/2	1-1/16	.540	.546	1/16
1/2	4	.6875	1-1/2	1-1/16	.524	.530	1/16
3/4	4	.9063	1-11/16	1-1/8	.690	.698	1/16
3/4	5	.9063	1-11/16	1-1/8	.690	.698	3/32
1	5	1.1250	1-7/8	1-1/4	.859	.867	3/32
1-1/4	5	1.3125	2-1/8	1-3/8	1.000	1.008	3/32
1-1/2	5	1.5000	2-1/4	1-3/8	1.141	1.149	3/32

SUN DEVELOPS 4 NEW CUTTING OILS

For Better Finishes, Higher Production, Tool Life Never Before Possible

Sun's continuous program of cutting oil research has discovered ways to make four well-known Sunicut grades even better. Their number designations remain the same, but the components and formulations are new. The results they'll give on your machines will be little short of amazing. Contact the nearest Sun Office today. A representative will gladly arrange a trial order.

SUNICUT 11. Dual-purpose oil for automatics machining nonferrous metals, free machining steels. Won't stain brass, copper.



SUNICUT 102. Active-sulphur, general-purpose oil for use in automatics working all types of steel, especially high-alloy steels.

SUNICUT 105. Transparent sulphurized cutting oil for heavy-duty jobs like gear cutting, broaching, and threading alloy steels.

SUNICUT 209. Dual-purpose oil for larger automatics working steel, brass, copper. Also hydraulic fluid for chucking machines.

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SUN INDUSTRIAL PRODUCTS

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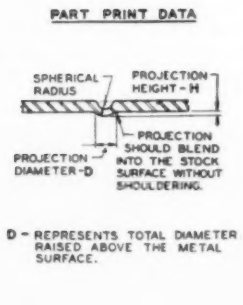
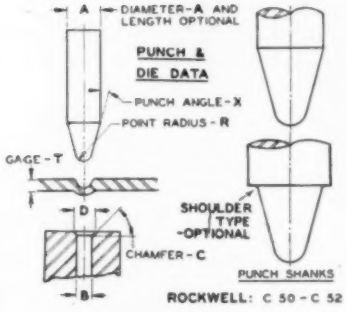
SUNOCO

Dies for Welding Projections


PART PRINT DATA
SPHERICAL RADIUS
PROJECTION HEIGHT - H
PROJECTION DIAMETER - D
PROJECTION SHOULD BLEND INTO THE STOCK SURFACE WITHOUT SHOULDERING.
D - REPRESENTS TOTAL DIAMETER RAISED ABOVE THE METAL SURFACE.



These data are used by the automotive industry for designing tools to emboss low-carbon sheets for projection welding. Make tools to the low limit of tolerance. When two different sheet thicknesses are to be welded, follow these rules: if projection is embossed in thinner sheet, select tool sizes according to thinner materials; if thicker piece is embossed projection height is for thinner material, but diameter, punch and die sizes are according to the thicker material.

PART PRINT DATA			PUNCH			DIE	
GAGE	PROJECTION DIAMETER	PROJECTION HEIGHT	POINT RADIUS	PUNCH ANGLE	PUNCH SHANK	DIE DIA	CHAMFER
T	D	H	R ±.002	X	A	B +.005 −.000	C
.012-.016	.075-.080	.015-.020	.031	15°	3/8	.062	45°
.018-.024	.090-.095	.020-.025	.031	15°	3/8	.079	45°
.027-.033	.105-.110	.025-.030	.047	15°	3/8	.095	45°
.036-.042	.120-.125	.030-.035	.047	15°	3/8	.110	45°
.048-.054	.135-.140	.035-.040	.047	15°	3/8	.125	45°
.060-.067	.150-.160	.040-.045	.062	15°	3/8	.140	45°
.076-.090	.170-.185	.045-.050	.062	15°	1/2	.140	45°
.105	.200-.215	.050-.055	.078	15°	1/2	.172	45°
.120	.220-.235	.050-.055	.094	15°	1/2	.191	45°
.135	.230-.250	.052-.060	.094	15°	1/2	.171	45°
.150	.250-.270	.052-.060	.109	15°	1/2	.188	45°
.165	.270-.290	.057-.065	.109	15°	1/2	.207	45°
.180	.290-.310	.057-.065	.109	15°	1/2	.227	45°
.195	.310-.330	.062-.070	.125	15°	1/2	.250	45°
.210	.330-.350	.062-.070	.141	15°	1/2	.272	45°
.225	.350-.370	.067-.075	.141	15°	1/2	.290	45°
.245	.370-.390	.067-.075	.156	15°	1/2	.312	45°
.265	.390-.410	.072-.080	.156	15°	1/2	.328	45°
.281	.410-.430	.077-.085	.187	15°	1/2	.348	45°
.312	.450-.480	.080-.090	.187	15°	1/2	.328	40°
.343	.490-.520	.085-.095	.187	15°	1/2	.368	40°
.375	.530-.560	.090-.100	.203	15°	1/2	.406	40°
.406	.560-.590	.095-.105	.219	15°	1/2	.437	40°
.437	.600-.630	.100-.110	.219	15°	1/2	.484	40°
.468	.640-.670	.105-.115	.234	15°	1/2	.515	40°
.500	.680-.710	.110-.120	.234	15°	1/2	.562	40°

What deburrs clutch discs three times as fast?

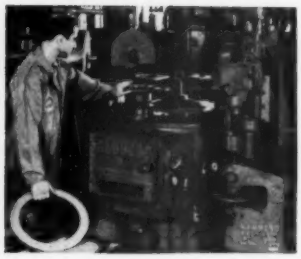
...*a brush!* To make tractor clutches operate smoothly, all burrs and sharp corners had to be removed by hand-filing and brushing the clutch disc teeth. Now, a five-station rotary automatic machine equipped with Osborn power brushes gets these results:

Triples output. Releases skilled personnel for other defense work. Assures uniform finishing of *every* disc for dependable clutch performance.

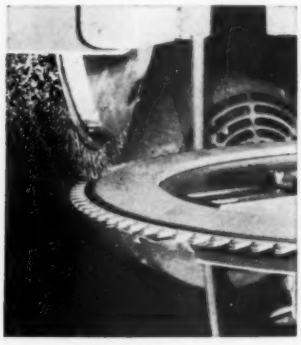
An **O**sborn **B**rushing **A**nalyst will gladly study your product-finishing and cleaning operations to suggest ways to speed production and cut costs. Call or write *The Osborn Manufacturing Company, Dept. 441, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

OSBORN

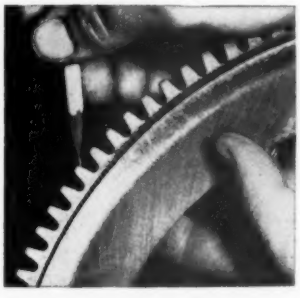
LOOK FOR THE NAME OSBORN . . . RECOGNIZED EVERYWHERE FOR QUALITY WORKMANSHIP AND MATERIALS



THE MACHINE... *a 5-head rotary automatic is used by this manufacturer to mechanize the brushing of clutch disc teeth. Each brush is powered by a 5 h.p. motor and rotates at 1750 r.p.m.*

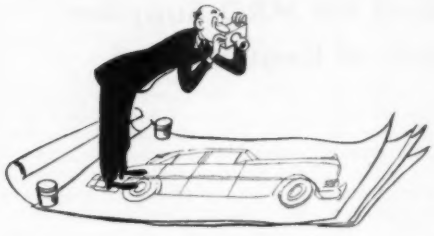


THE OPERATION. *Four of the stations brush across the teeth like the one shown above. Fifth station brushes* into *the teeth.*



THE RESULTS. *Output is tripled. Manpower is conserved. Every disc is thoroughly and uniformly deburred. When clutches are assembled and tested, they operate smoothly and efficiently.*

TALKING SHOP



Ford Filming

FORD MOTOR COMPANY has microfilmed 1,250,000 of its vital designs and engineering tracings as a security precaution. Negatives are stored in fireproof storage vaults at Dearborn, Mich., positives in underground vaults elsewhere. Thus far, 4,500,000 shots have been made; 3,000,000 more are to be made.

To get some idea of Ford drawings consider these 1949 use figures for the engineering staff alone: 13 million sq ft of blueprint paper, 7 million sq ft of diazo paper, 500,000 sq ft of autopositive paper.

Rolling Drum

VAN LEER of England has built a mobile drum factory for Metal Containers, Ltd. Built on six trailers, it has its own electrical, compressed-air, and water supply equipment and can produce 1000 finish-formed and painted drums every 8 hr. Side walls of trailers are let down to form a working floor between them, and roof trusses and posts permit the whole area to be enclosed with awnings. From road condition to operation requires 19 min.

Closer Speed Control

WILLIAM COOMEY, general superintendent of Rice-Barton, Worcester, Mass., suggested at the recent ASTE meeting that machine tools equipped with drives like the GE *Thymatrol* or the Westinghouse *Mototrol* would offer about 240:1 speed ratio, as compared with the 4:1 ratios of the taper-cone drives of only a few years ago. They are currently too expensive for machine-tool use, but extensive application may bring the price within reason, and the resulting benefits will more than justify a somewhat higher price. Flexibility in speed is essential to attain most-efficient machining.

High Plug

LATEST in high-altitude aircraft sparkplugs is one with monolithic insulator developed by AC Spark Plug for P & W engines in the B-36. The insulator is aluminum oxide, with the center electrode sealed in with "resistance glass." Electrodes are platinum wire and the core is centrifugally cast silver. Ordinary ceramics leak electricity at altitudes of 8 mi and above, hence the change.

Daffynitions

GENTLEMAN: man who steps on his cigarette so it won't burn the carpet . . . GREENSKEEPER: bank teller . . . HARDENED ARTERIES: paved roads . . . SMALL TOWN . . . where everybody knows whose check is good and whose husband isn't . . . MIDDLE AGE: when a man would rather not have a good time than have to get over it . . . JUNK YARD: Chinese naval base . . . SOAP OPERA: Thud and blunder . . . HOLLYWOOD STARLET: glamateur . . . PIGEONS: asphalt pheasants . . . TRADEMARKS: Wrinkles in a businessman's face . . . HORSE SENSE: Naying at the right time . . . TAXPAYER: paytriot . . . DEFICIT: difference between taxes the government wants and what it has nerve enough to collect . . . CONFUSION: word preceded by "utter" . . . TOOTHACHE: gets old dentist bills paid.

Wireless Wire

PACKARD ELECTRIC DIV., GM, is now making a high-resistance ignition wire for automobiles that eliminates interference with car radios. It contains no wire; instead, a core of linen thread is graphite-impregnated.

Electrical Grinding

HUNGARIAN BULLETIN, described as a "Communist glorification sheet," reports that carbide bits are sharpened in a new machine by "grinding" with a steel disk. The negative lead of a dc source is connected to the disk, the positive lead to the work. Water glass is electrolyte and coolant. The machine has pushbutton control, is said to be faster and less likely to crack the carbide.

Also mentioned is further application of machine tools akin to our tap disintegrator. The new job is milling materials too hard to mill, using 17-volt ac to disintegrate the surface. Many readers will remember our description of this process, as translated from the Russian, about four years ago. All should remember the recent article (*AM*, April 2) describing "grilling" hardened steel.

Prescient Scale

BOB FREEBORN, who sets time standards in the machine shop of the Hamilton plant, Otis Elevator Company, recently stepped on one of those scales that give your weight and your fortune for a penny. Weight: 181. Fortune: "You have the courage to set your own standards and adhere to them regardless of adverse criticism."

What Do They Read?

IN THE PAST 25 months, General Motors has distributed 21,000,000 copies of 148 booklets to employes through its free Information Rack Service. Social and economic material totalled 36%, home and family 18%, safety and health 16%, inspirational 13%, GM information 9%, and scientific and mechanical 8%.

News of Metalworking——

17 Firms Get Pool Orders

WASHINGTON—"Pool orders" for machine tools totaling $78,443,271 have been given by General Services Administration to 17 qualified manufacturers.

Under the machine tool pool orders system, GSA, upon recommendations of the National Production Authority, places orders with manufacturers to enable them to fit the machines into their production schedule without delay.

The first four orders listed below were announced by GSA April 6; the others March 28. Name of contractors and value of the pool orders follow:

Cincinnati Gilbert Tool Co., $1,113,600; **Fellows Gear Shaper Co.**, Springfield, Vt., $6,622,577; **Lees-Bradner Co.**, Cleveland, $2,246,100; **Morey Machinery Co.**, New York, $5,283,975; **Barber-Colman Co.**, Rockford, Ill., $2,127,375; **Bardons & Oliver, Inc.**, Cleveland, $524,698; **Cleveland Hobbing Machine Co.**, $1,059,450; **Gisholt Machine Co.**, Madison, Wis., $12,200,750; **Gleason Works**, Rochester, N.Y., $3,314,422; **Gear Grinding Machine Co.**, Detroit, $3,532,000; **Gould & Eberhardt, Inc.**, Irvington, N.J., $2,678,370; **Illinois Tool Works**, Chicago, $980,880; **Jones & Lamson Machine Co.**, Springfield, Vt., $9,029,157; **Michigan Tool Co.**, Detroit, $2,677,370; **National Broach & Machine Co.**, Detroit, $4,452,600; **Norton Co.**, Worcester, Mass., $8,266,072; **Warner & Swasey Co.**, Cleveland, $12,333,875.

Flood of Orders for MRO Supplies Forces Revision of Regulation 4

WASHINGTON—A rising torrent of orders is killing NPA's plan to have every kind of business issue its own DO for maintenance, repairs and operating supplies.

In the hope of saving at least parts of the plan, NPA is revising its Regulation 4, which established the "write your own DO" system for MRO supplies.

The revision will have a much more specific definition of what "operating supplies" are as contrasted to "production supplies."

• **NPA was unprepared** for the number of orders business let loose for MRO supplies, each bearing the DO-97 symbol allowed by Regulation 4. Suppliers of products essential to defense industries have reported that their stocks are being swept clean by orders from non-defense business.

The impact has been particularly heavy on steel products. NPA is making a belated effort to try and police Regulation 4 by asking steel producers to report excessively large orders bearing the DO-97 label.

NPA officials are willing to admit the wording of Regulation 4 is at fault. They also think many businesses have stretched the intent of the order in an effort to build inventories of production supplies in the guise of ordering MRO needs.

For instance: welding rod, when used to maintain machinery or to make repairs, is clearly "operating supplies" in the minds of the planners who wrote Regulation 4. But when welding rod goes out of the plant as part of the finished product, NPA considers it "production supplies" and outside MRO scope.

Under Regulation 4 as now interpreted by many businesses, welding rod has been snapped up under the DO-97 label. It is now difficult to obtain in some areas. The same thing has happened to hundreds of items which are both operating and production supplies, according to the specific use they're put to.

Under Regulation 4, any material carried as operating supplies under "established accounting practice" qualifies for a DO-97.

Tight Labor Market in Nation, but Situation

NEW YORK—The labor supply nationwide is tight, but not yet critical.

In a survey of such important production centers as Detroit, Cleveland, Chicago, San Francisco, Los Angeles and New York, AMERICAN MACHINIST editors found the labor market tight enough in some areas that larger plants are resorting to devious means of luring production workers into their plants. But elsewhere materials shortages have caused layoffs, and an occasional occupational surplus here and there keeps the situation from being labeled "critical," in terms of World War II shortages.

• **Labor hoarding** was noted in a few instances. The practice is growing in Cleveland in anticipation of defense orders to come. More than one manufacturer is hiring all the skilled men obtainable, keeping them on the payroll at the men's highest skills, just waiting to put them to work when the defense orders arrive.

Around Los Angeles, "make-work" jobs are frequently reported, with nearly-idle employees retained on payroll. One construction machinery firm reached peak employment six months ago, but orders have dropped considerably with no subsequent layoffs. Reason: defense orders are hoped for soon. But if the orders don't come through in the next two months, the make-work jobs will have to end and layoffs begin.

• **Labor pirating** charges are being heard in some areas as bidding for skilled workers is intensified. In the New York area advertisements offer evening and week-end interviews in an apparent attempt to lure away from their jobs men already employed. Small machinery firms in the area claim large contractors are recruiting on paydays in saloons close to machine shops.

One method attracting attention in Cleveland is use of cut-away models and full-sized models of their products in dressy downtown store windows. The windows get a lot of attention. Some of the exhibitors have employment department clerks inside the stores to accept applications and one or two have decoy men standing on the outside to strike up conversations with the unwary.

In San Francisco there has been some movement to the Naval shipyards, attracted by overtime pay, but federal agencies in the area have agreed not to accept applications from defense industry workers who do not have releases from their present employers.

Labor pirating—if it can be called that—has taken an interesting twist in Los Angeles. Aircraft workers already employed at one plant are applying for identical or better work at another which is advertising for skilled labor. Reasons given: to get

Mobilizers Work Out Bugs in CMP Order

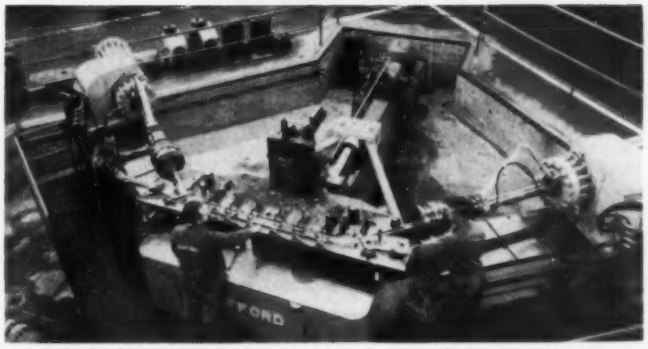
WASHINGTON — The 1951 version of a Controlled Materials Plan is hard a-borning. The decision to have CMP was made weeks ago. But all the details still haven't been worked out.

Biggest difficulty evolved from the mobilizers' choice of the so-called "open-end" CMP as most practicable to meet present and foreseeable needs for materials controls. But an "open end" CMP means complete regulation of only a portion of the supply of steel, copper and aluminum. How to prevent a chaotic scramble for the remaining "free" metal was the puzzler which stalled announcement of CMP for weeks.

The answer still hasn't been spelled out in detail, but the mobilizers are going ahead with the new program just the same.

Initially, virtually all users of controlled materials will be asked, in advance, for estimates of their quarterly requirements for steel, copper and aluminum. These will be measured against comparable quarterly supplies of the three metals, which the mobilizers already have on hand.

After the exact excess of demand over supply is calculated, the controllers will balance the two totals by ordering cutbacks in production of some major metal consumers.



A 75% REDUCTION IN TIME required to make a vital part of the jet-powered B-47 Stratojet bomber, now in quantity production in Boeing's Wichita Div. plants, was achieved through use of Hufford extrusion stretch press shown here turning out cam tracks, a device used in raising and lowering wing flaps. The operation was formerly performed on a hydraulically-controlled duplicator. A straight 75-ST aluminum extrusion is placed in the press where it is stretched and bent at the same time. The aluminum strip is then removed from the machine and cut to make two cam tracks.

Metalworking Firms Get Certificates of Necessity

WASHINGTON — Metalworking industries are still getting a great big percentage of certificates of necessity being approved by the Defense Production Administration. The certificates entitle a company to expand all or part of the cost of a new facility in five years.

A list of companies that have been given certificates since March 5 follows. The dollar figure shows the amount of the cost which was given fast amortization; the percentage figure shows what percent of this cost may be written off in five years:

Continental Machines, Inc., Savage, Minn., $262,250—85%; Torrington Co., Inc. of Indiana, South Bend, $312,549—85%; Accurate Products Co., Hillside, N.J., $102,715—80%; Firth Sterling Steel & Carbide Corp., McKeesport, Pa., $219,956—85%; Worthington Pump & Machinery Corp., Piscataway, N.J., $211,470—90%; Hardinge Bros. Inc., Elmira, N.Y., $128,957—85%; Peerless Tool & Engineering Co., Chicago, $149,087—90%; Lake Erie Engineering Corp., Tonawanda, N.Y., $271,758—80%.

Not Critical; Some Pirating of Workers Noted

off night shift and onto day or to increase wages a few cents.

• **Lowering of hiring standards** on age, color, and physical standards is evident nationwide. Many firms are less fussy about technical qualifications now than they were a few months ago. Employers can't find workers now with the same long years of experience formerly demanded.

According to the New York State Employment Service, out of town firms advertising in New York City for radar and other technical personnel found respondents inferior in qualifications compared with a group recruited only two months back.

• **Training programs** to improve the labor supply in California are getting under way by Navy shipyards and by the California Metal Trades Association. Food Machinery & Chemical Corp., with a multi-million dollar contract for military vehicles, expects to do some vestibule training, but mostly on the job. Kaiser's new aircraft division, which holds Lockheed subcontracts, has been sending groups of 25 men at a time down to Los Angeles for three-week on-the-job training periods at Lockheed. Other companies are getting around shortages by breaking down skilled jobs into two or three semi-skilled positions, training more women.

No great movement is underway to hire women in Detroit. Rosie the Riveter, of course, is in all plants alongside men; she never left post-war.

A Chicago electronics manufacturer has instituted a large program to train women as skilled turret lathe operators, and is rehiring and upgrading women operators employed at its plants during the last war.

A cutting tool manufacturer in the Midwest is hiring and training women for production jobs, though not to a large extent as yet. Recently the firm put about a dozen women to work as machine operators — lathes and milling machines principally—in the cutting tool dept.

Tight as the labor market is, there is only scattered evidence that production has been hurt by the manpower shortages.

In New York, some sheet metal firms have been forced to curtail production on government contracts because of a shortage of skilled workers. A few Chicago firms report production is being hampered by labor shortages.

• **The labor market** in most areas can become very acute overnight, potentially, but most manpower experts are estimating that it isn't in the cards for a number of months. The market will get much tighter then, as war jobs now being tooled start rolling.

MERGERS AND PURCHASES

• **American Machine & Foundry Co.**, New York, has purchased Cleveland Welding Co., manufacturer of bicycles, demountable truck and tractor rims, and other circular welded products.

• **New Britain Machine Co.** has sold its Shop Furniture Div. to the Industrial Bench & Equipment Mfg. Co. of New Britain, Conn.

• **Mallory-Sharon Titanium Corp.** has been formed at Indianapolis by P. R. Mallory & Co., Inc., and Sharon Steel Corp., each firm having a 50% interest. The new company will develop, produce and market titanium and titanium alloys. Mallory Co. has been active in titanium research. A Sharon subsidiary, Niles Rolling Mill Co., has gained rolling experience on large titanium sheets.

• **Worthington-Gamon Meter Co.**, Newark, N. J., formerly a subsidiary of Worthington Pump & Machinery Corp., Harrison, N. J., has been made a division of that corporation.

• **Nebel Machine Tool Co.**, 52-year-old Cincinnati lathe manufacturing firm, has been purchased by Charles Wm. Doopke and Frederick W. Doopke of Cincinnati. The Nebel name will be continued, and there will be no changes in personnel.

• **Aeroquip Corp.**, Jackson, Mich., has purchased Metalco, Inc., Jackson, to be operated as a wholly-owned subsidiary. Metalco operations will be moved to a larger plant in Cheboygan, Mich.

• **Baldwin-Lima-Hamilton Corp.**, Eddystone, Pa., has purchased Austin-Western Co., Aurora, Ill. Austin-Western will continue to serve its customers under its own name.

• **Essick Mfg. Co.**, Los Angeles, has purchased Sterling Machinery Co., Kansas City, Mo., manufacturers of self-priming pumps, mining and contractors hoists. Essick makes air cooling equipment and construction machinery.

• **Bronze Bearings, Inc.**, Cranford, N. J., has been organized to take over manufacture and sale of bearings, bushings, and non-ferrous castings formerly produced by S & H Bearing Mfg. Co., Cranford, N. J.

Tool and Die Industry Calls for Steps to Cut Down Labor Pirating

NEW YORK—The vital tool and die industry will be hurt seriously unless definite governmental steps are taken to cut down labor pirating practices, the National Tool & Die Manufacturers Association stated at a recent special Mobilization Committee meeting here.

Sudden emergence of big defense plants in already tight labor areas is causing labor dislocations, according to Richard F. Moore, president of Moore Special Tool Co., Inc. For example, when such a plant moves in, it gets authority to offer a bit more than the going rates for the area, on the theory that the new company will not be able to offer "fringe" benefits. As a result, a skilled toolmaker, vital to the small tool company, moves over to do a routine production job in the big company, wasting manpower skill.

In Cincinnati the going rate for toolmen is about $1.65, but a big auto maker now working in the area on defense contracts is offering $1.95 plus 5¢ every 60 days until $2.25 per hr is reached. A small shop, frozen at lower levels, can't meet those figures legally, remarked Herbert Murrer, president, Murrer Tool Co.

The Committee is considering several approaches to recommend. Among them: establishment of maximum area rates for various jobs; permission for tool and contract shops to meet rates paid by mass-production plants or new contract shops; establishment of maximum area hiring rates that are low enough to discourage labor migration without good reason.

NTDMA Committee members said they are not in favor of any type of regulation that would freeze men in jobs. Their theory: a man should have the right to change. Their problem: to achieve, legally, wage rates that will keep men satisfied.

Other committee members present included: Centre W. Holmberg, president of August W. Holmberg & Co., Inc.; Kenneth Arvedon, New York Tool & Die Institute; Lawrence H. Cook, president of Lawrence H. Cook, Inc.; Philip Marsillus, Production Machine Co., Bridgeport.

Metal Powder Group to Hold Show

CLEVELAND — Eighteen manufacturers will exhibit at the 1951 Metal Powder Show and seventh annual meeting of the Metal Powder Association to be held at the Hotel Cleveland April 25-26.

Technical papers to be presented include: "The 'Flywheel' Effect in Infiltrated Metal Powder Parts," by George Stern, technical director, American Electro Metal Corp.; "Powdered Iron Materials in High Frequency Transformers for Military Equipment," by H. W. Lord, Research & Development Board, Department of Defense; "Metal Powders in Some Small Arms Ammunition Applications," by Col. G. A. Miller, Jr., Frankford Arsenal, Philadelphia; "Sintered Iron Rotating Bands and Cemented Carbide Cores for Ordnance Use," by A. M. Burghardt, Watertown Arsenal, Mass.

Closing day discussions include: "Metallographic Study of the Sintering of Brass Powders," by C. J. Bier, chief engineer, Powder Metal Div., Radio Cores, Inc., Oak Lawn, Ill.; "Powder Metallurgy Versus Drawn Wire Method of Producing Gears," by John Rigby, John Rigby & Sons, England; and "Metal Powder Applications in the Home Appliance Field," by J. D. Carey, General Electric Co., Bridgeport, Conn.

Computers Aid Auto Industry

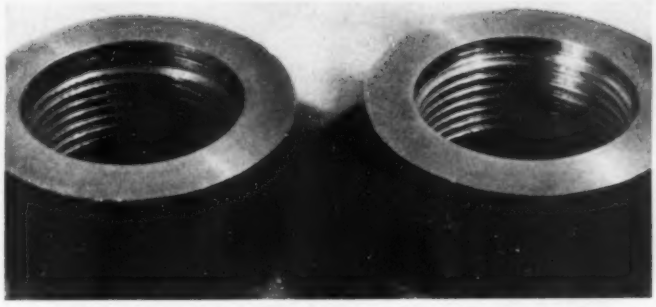
DETROIT—Practical applications of automatic computing machinery to the automotive industry problems were outlined by Paul T. Nims of Chrysler Corp. before the Wayne Conference on Automatic Computing Machinery and Applications here March 27-28.

Several types of problems can be handled on these computing machines: Substituting in formulae, sequential and iterative calculations, errors of transcription, reduction of data-taking, sorting data and getting a picture of performance, solving a series of algebraic simultaneous equations with different variables, and integration.

Motor Selection Course Announced by G.E.

SCHENECTADY, N. Y. — General Electric Co. has announced a new educational program designed to aid in rapid training of industrial personnel in selection and application of modern electric motor drives.

The program, 15th in the company's "More Power to America" series, consists of a motor selection and application course made up of nine 35mm black-and-white slidefilms, student review booklets on each lesson, and an instructor's manual.



WAX TAPPING LUBRICANT permits cutting clean threads in hard-steel casting (right), whereas threads are torn when tapped without wax (left). S. C. Johnson & Son, Inc., Racine, Wis., wax manufacturers, reports also that specially blended waxes aid deep drawing and extend die life.

Chicago Materials Handling Show Exhibitors Listed

(See "Show in Print" starting page 190.)

Acme Steel Co. 518
Addison-Semmes Corp. 943
Aerol Co., Inc. 422
Aeroquip Corp. 414
Albion Industries, Inc. 102
All Steel Welded Truck Co. 809
Alvey Conveyor Mfg. Co. 233
Alvey Ferguson Co. 420
American Chain & Cable Co., Inc. 137
American Engineering Co. 304
American Machinist 448
American MonoRail Co. 216
American Pulley Co. 923
American Sales Engineers 836
American Steel & Iron Works 248
American Steel & Wire Co. 205
Americana Corp. 145
Anchor Steel & Conveyor Co. 824
Albert & J. M. Anderson Mfg. Co. 801
Anthony Co. 202
Arkansas Pallet Corp. 439
Arrow Products Inc. 825
Austin-Western Co. 702
Automatic Transportation Co. 313
Baker Industrial Truck Div., Baker-Raulang Co. 306
Baldwin Locomotive Works 252
Barber-Greene Co. 416
Barrett-Cravens Co. 519
Bassick Co. 126
Benbow Mfg. Co. 451
Bond Foundry & Machine Co. 521
Bosworth Mfg. Co. 412
Brainard Steel Co. 521
Buda Co. 503
E. W. Buschman Co. 328
Butler Bin Co. 817
C & D Batteries, Inc. 444
Chicago Tramrail Corporation 1123
Chisholm-Moore Hoist Corp. 549
City Machine & Wheel Co. 415
Clark Equipment Co., Industrial Truck Div. 329
Cleveland Tramrail Div., Cleveland Crane & Eng'r'g Co. 449
Coffing Hoist Co. 108
Coles Cranes Inc. 704
Colson Corp. 835
Columbia Steel Co. 205
Conco Engineering Works 142
Continental Diamond Fibre Co. 920
Continental Motors Corp. 526
Conveyor Specialty Co., Inc. 527
Crescent Truck Co. 532
Cyclone Fence Div., American Steel & Wire Co. 205
Darnell Corp., Ltd. 548
Dempster Brothers Inc. 206
Drake Startzman Sheahan Barclay, Inc. 119
Economy Engineering Co. 921
Thomas A. Edison, Inc., Storage Battery Div. 232
Electric Industrial Truck Assn. 241
Electric Products Co. 124
Electric Storage Battery Co. 506
Elwell-Parker Electric Co. 301
Equipment Mfg. Inc. 256
Fab-Weld Corp. 150
Fairbanks Co. 425
Faultless Caster Corp. 417
Harry J. Ferguson Co. 436
Fibre Specialty Mfg. Co. 551
Foote Bros. Gear & Machine Corp. 1002
Garlock Packing Co. 808
General Electric Co. 221
Gerlinger Carrier Co. 312
A. J. Gerrard & Co. 113, 114
Gerrard Steel Strapping Co. 205
Globe Hoist Co. 542
Gould Storage Battery Corp. 517
Grand Specialties Co. 1110
Harnischfeger Corp. 713
Hertner Electric Co. 435
Frank G. Hough Co. 207
Jacob House & Sons 133
Hydraulic Equipment Co. 540
Hydroway Scales, Inc. 802
Hyster Co. 442
Ideal Stencil Machine Co. 524
Industrial Engineering & Manufacturing Co., Inc. 831
Inland Wire Products Co. 942
International Staple & Machine Co. 842
Ironbound Box & Lumber Co. 140
Island Equipment Corp. 235
Joyce-Cridland Co. 409
Kalamazoo Mfg. Co. 223
Geo. D. Kelley Lumber Co. 1024
Knickerbocker Co. 423
Koehring Co. 554
Kwik-Mix Co. 554
Lamson Corp. 243
Lanham Co. 211
Lansing Co. 546
Thomas Laughlin Co. 905
G. B. Lewis Co. 403
Lewis-Shepard Products Inc. 320
Lift Trucks, Inc. 512
Lull Mfg. Co. 511
Lyon-Raymond Corp. 445
Magline Inc. 227
Magnesium Co. of America 522
Manning, Maxwell & Moore, Inc. 421
Mansaver Industries, Inc. 105
Market Forge Co. 924
Marsh Stencil Machine Co. 130
Martindale Electric Co. 901
Material Handling Equipment Co. of New York 532
May-Fran Engineering, Inc. 437
Mechanical Handling Systems Inc. 936
Mercury Mfg. Co. 426
Midwest Precision Corp. 552
Mobilift Corp. 237
Monroe Auto Equipment Co. 143
Monroe Sales Corp. 1020
Motor Generator Corp. 434
Motorola Inc. 1121
The Moto-Truc Co. 201
National Wooden Box Assn. 902
Orangeville Mfg. Co. 429
Otis Elevator Co. 139
Peltier Corp. 136
Pesco Products Div., Borg-Warner Corp. 117
Pittsburgh Steel Co. 446
Powell Pressed Steel Co. 507
Prime-Mover Co. 810
Rack Engineering Co. 127
Rapids-Standard Co., Inc. 154
Ready-Power Co. 427
Revolvator Co. 125
Richards-Wilcox Mfg. Co. 525
Robbins & Meyers, Inc. 218
John A. Roebling's Sons Co. 509
Ross Carrier Co. 120
David Round & Son 447
Rowe Methods Inc. 839
Ruger Equipment Co., Inc. 433
Saginaw Products Corp. 432
Sermat Conveyor Div., Peterson Products Corp. 408
Service Caster & Truck Corp. 816
Service Supply Co. 210
R. T. Sheehan Co. 257
Sherman Paper Products Corp. 440
Signode Steel Strapping Co. 431
Silent Hoist & Crane Co., Inc. 505
Sisalkraft Co. 430
Skarnes Engrg. & Supply Inc. 246
Speedways Conveyors, Inc. 318
Standard Conveyor Co. 148
Stanley Works, Steel Strapping Div. 538
Star Kimble Motor Div., Miehle Printing Press & Mfg. Co. 132
Steel-Parts Mfg. Co. 411
Sterling Bolt Co. 407
Sterling Lumber & Supply Co. 239
Stevens Appliance Truck Co. 406
Teleflex Inc. 820
G. H. Tennant Co. 215
Thew Shovel Co. 316
Thomas Truck & Caster Co. 147
Toledo Scale Co. 228
Tote System, Inc. 821
Towmotor Corp. 322
Tractomotive Corp. 904
Traffic Service Corp. 326
Triangle Equipment Co., Inc. 553
Truscon Steel Co. 220
Union Metal Mfg. Co. 153
Union Steel Products Co. 141
Unistrut Products Co. 224
Unit Crane & Shovel Corp. 121
U. S. Steel Co. 205
U. S. Steel Export Co. 205
U. S. Steel Supply Co. 205
Vickers Inc. 529
Waterman Engrg. Co. 110
Wayne Crane Div., American Steel Dredge Co., Inc. 725
Jervis B. Webb Co. 219
Wellington Machine Co. 259
West Bend Equipment Corp. 138
Westinghouse Electric Corp. 203
Whiting Corp. 533
Williford Mfg. Co. 804
Wilshire Power Sweeper Co. 115
Wirebound Box Mfrs. Assn. 111
L & H Wood Mfg. Co. 537
Yale & Towne Mfg. Co. 317
Hamlin Metal Products Co. 934
Abell-Howe Co. 919
American Machine & Foundry Co. 1019
Belt Corp. 841
Dings Magnetic Separator Co. 1112
Charles Wm. Doepke Co. 1031
Howe Scale Co. 1024
Industrial Equipment Co. 233
Magne-Plastic Corp. 815
Walter Maguire Co., Inc. 153
Marvel Industries Inc. 917
Master Addresser Co. 941
Master Builders Co. 812
Matson Navigation Co. 1101
Michigan Crane & Conveyor Co. 828
Monroe Co., Inc. 834
Pettibone Mulligan Co. 1116
Rydin-Railway Equipment Co. 1026
Sasgen Derrick Co. 1118
Spaulding Fibre Co., Inc. 826
Youngstown Steel Door Co. 907
Caldwell Co. 1126
Seedburo Equipment Co. 917
Cushman Motors 813
Meili Blumberg Corp. 1009
Berlin Chapman Co. 913
Mandt Mfg. Co. 916
Lincoln Electric Co. 1003
Powers Wire Products 1042
Crescent Metal Products 1120
Clyde Iron Works 911
Protectoseal Co. 104
Wilkie Co. 516
National Pallet Corp. 1105
Elberta Crate & Box Co. 824
Equipto Div., Aurora Equipment Co. 1144
Young Iron Works 1102
H & S Mfg. Co. 545
Hykap, Inc. 724-A
Weber Addressing Machine Co. 133
Clark Door Co. 1122
Material Handling Institute 402-A
Radio Corporation of America 918
W. W. Carron & Associates 1128

Hayward A. Gay

Carl M. Beach

Carl F. Stugard

Harry K. Clark

Names in the News

Hayward A. Gay has been elected a vice president of Cincinnati Milling Machine Co., and **Carl M. Beach** was named domestic sales manager for all machinery products. **Carl Stugard** has been named manager of the Chicago office, Cincinnati Milling & Grinding Machines, Inc., sales subsidiary. Mr. Gay joined Cincinnati Milling in 1932, and served from 1935 to 1943 as field engineer in the Detroit office. Later he was named manager, Cimcool Div., and then manager, Cincinnati Milling Products Div. Later he became vice president and director of the subsidiary Carlisle Chemical Works, Inc. Mr. Beach served from 1941-44 as field engineer, Chicago office, and then was named manager, Detroit office. In 1949 he was named assistant sales manager of Cincinnati Milling. Mr. Stugard joined the firm in 1937, in 1942 served in the New York office as field engineer, and was named manager, Pittsburgh office in 1947.

Charles E. Wilderman and **Daniel E. Waterbury** have been named vice presidents of Utica Drop Forge & Tool Corp. Mr. Wilderman joined the firm in 1945 as chief metallurgist. Prior to his new appointment, he served as division manager. Mr. Waterbury joined the firm in 1946, and was production control manager prior to his new appointment.

Norman K. Russell has been named refractories engineer, Norton Co., Worcester, Mass., succeeding the late **Russell L. Peck.** His headquarters will be at Norton's Philadelphia warehouse. He was formerly with Norton's refractories sales engineering department at the Worcester plant.

Amos C. Bledsoe has been named division superintendent, sheet and tin, of the new Fairless Works of United States Steel Co. to be built near Morrisville, Pa. **John F. Brownlee** was named superintendent, production planning; **Kermit L. Johnsen** was named division superintendent, central maintenance and utilities; **Theodore J. Koenig** was named division superintendent, rolling; **Fred B. Lafferty Jr.,** superintendent, industrial relations; **Emerson R. Miller,** division superintendent, blast furnaces, coke ovens and by-products; **Maynard J. Rich,** plant industrial engineer; and **Lester R. Walker,** chief metallurgist and inspector.

Dean Hammond was named vice president in charge of engineering, Kaiser Frazer Corp., Willow Run, Mich. He will direct engineering for the company's aircraft defense contracts as well as in automotive development. **S. W. Taylor,** administrative engineer since 1948, was named executive engineer.

William R. Gerhardt has been named assistant director of procurement for Remington Rand Inc., New York. He was with Mallinckrodt Chemical Works, St. Louis, previously. He retired as a colonel, U. S. Army, after 30 years' service, his last assignment being commanding officer and general manager of Watertown Arsenal.

Theodore E. Spilker, secretary, has been named vice president and secretary of Nice Ball Bearing Co., Philadelphia. **John E. Mullen,** formerly plant manager, was named vice president, and **Henry M. McAdoo,** assistant to Mr. Mullen, was named plant manager.

Harry K. Clark, president of Carborundum Co., Niagara Falls, N. Y., has been appointed vice chairman of the Munitions Board in Washington in charge of coordinating arms and civilian production.

Frederick W. Thomas has been named director of purchases, Joy Mfg. Co., Pittsburgh, succeeding **George R. Fox,** named assistant vice president in charge of the company plant expansion program. Mr. Thomas was general manager of purchases, Worthington Pump & Machinery Corp. Mr. Fox, who has been with Joy since 1945, previously was vice president and general manager of Arms-Franklin Corp., Franklin, Pa.

Charles C. Sigmier has been elected chairman of the board of Parker Appliance Co., Cleveland. He succeeds **Herbert I. Markham,** who continues as chairman of the finance committee of the board. Mr. Sigmier is vice president of Cleveland Trust Co.

Tomlinson Fort, L. W. McLeod, Emery W. Loomis, L. E. Lynde, and **Mark W. Cresap, Jr.,** have been elected vice president of Westinghouse Electric Corp., Pittsburgh. Mr. Fort is manager, Headquarters Apparatus Sales Dept.; Mr. McLeod is southwestern district manager; Mr. Loomis is middle Atlantic district manager; and Mr. Lynde, who has been New England district manager, now heads the Washington D.C. government office. Mr. Cresap, a management consultant, was also named assistant to the president. **W. G. Miller** has been named manager of manufacturing, Motor & Control Div., Buffalo. **W. H. Dickinson** has been named director, Engineering Dept., Headquarters Manufacturing Div., and **G. P. Longabaugh** was named director of the division's Headquarters Equipment Dept.

O. P. Proudfoot

C. O. Newton

D. E. Gilbert

W. J. McBrian

O. P. Proudfoot has been named manager, Cleveland district sales office, Cutler-Hammer, Inc., Milwaukee. He succeeds **R. J. Eckstein** who died Feb. 14. Mr. Proudfoot joined the firm in 1928. Since 1946 he has served with the Buffalo district sales staff.

M. A. Moore has been named eastern division manufacturing and sales manager of Double Seal Ring Co., Ft. Worth, Tex., operating out of New Rochelle, N. Y. He was formerly sales and service representative in Maine, Vermont and New Hampshire.

J. S. Smith has been named director of purchases, Wagner Electric Corp., St. Louis, Mo. He joined the firm in 1919, and in 1942 was named manager, Industrial Sales Dept.

L. L. Waite has been elected vice president and directing head of North American Aviation's new Electro-Mechanical Div. He had been assistant to the president in charge of the Aerophysics laboratory. **Dr. N. E. Edlefsen** was named technical director, Electro-Mechanical Div.

Harry L. Emerson has been named vice president in charge of manufacturing, Rockford Clutch Div., Borg-Warner Corp., Chicago. He continues as works manager, also. **Andrew W. Rose** was named assistant general manager, Warner Gear Div., at Muncie, Ind. **Carl R. Brick** has been named an assistant to **Roy C. Ingersoll,** president of Borg-Warner. **Thur Schmidt** was named assistant to the president of Ingersoll Products Div.

Maurice J. Erisman has been named assistant chief engineer, Pershing Road Chicago plant, Link-Belt Co. He was chief engineer at the Los Angeles plant, where he has been succeeded by **Homer J. Foye.**

C. O. Newton has been named eastern sales manager, L. S. Starrett Co., Athol, Mass. He has been succeeded as manager of the New York branch by **D. E. Gilbert,** formerly in charge of the western New England territory. **C. A. Bassett** replaces Mr. Gilbert in western New England. **E. E. Warner,** purchasing agent since 1929, has retired, being succeeded by **C. B. McMillan,** previously assistant purchasing agent.

Ab Martin has been named manager of the Fort Wayne (Ind.) Works, Apparatus Dept., General Electric Co., succeeding **C. H. Matson,** named manufacturing consultant of the Small Apparatus Div. staff with assigned duties on manufacturing administrative activities. Mr. Martin was named assistant manager at Fort Wayne in Sept., 1950. Other Apparatus Dept. appointments: **Francis J. Boucher,** manager of manufacturing, Small & Medium Motor Div.; **Robert R. Person,** staff assistant to the manager of manufacturing, Large Apparatus Div.; **William F. Oswalt,** assistant manager of manufacturing, Control Div.; **Frank T. Gamec,** production manager, Control Div.; **Elliott Harrington,** vice chairman and secretary of a newly-established Defense Projects & Priorities Committee of the Small & Medium Motor Div.; **R. S. Walsh,** manager, Induction Motor Sales Div.; **Francis K. McCune,** manager of engineering, Large Apparatus Div., succeeding **Ernest E. Johnson,** named general manager, General Engineering Laboratory. Mr. McCune, who was assistant general manager, Nucleonics Dept., is succeeded there by **William E. Johnson. W. G. Arnold** was named manager of manufacturing, Welding Dept.

John T. Monahan has been named assistant sales manager, Safety Products Div., American Optical Co., Southbridge, Mass.

W. J. McBrian, vice president of Caterpillar Tractor Co., Peoria, Ill., has been appointed vice chairman for Procurement and Distribution, Munitions Board, Washington, D. C.

Paul Reeves has been named director of sales, Timken Roller Bearing Co., Canton, Ohio. He joined the firm in 1929.

Howard Bradow has been named assistant superintendent of inspection in charge of manufacturing operations, Buick Motor Div., General Motors Corp., Flint, Mich. He succeeds **Don Taylor,** named assistant general superintendent in charge of production of tank transmissions.

William C. Miller has been named plant manager of Plant 4 of Richard Brothers Div., Allied Products Corp., Hillsdale, Mich. **John Hall,** formerly shop foreman, succeeds Mr. Miller as sales engineer in Detroit.

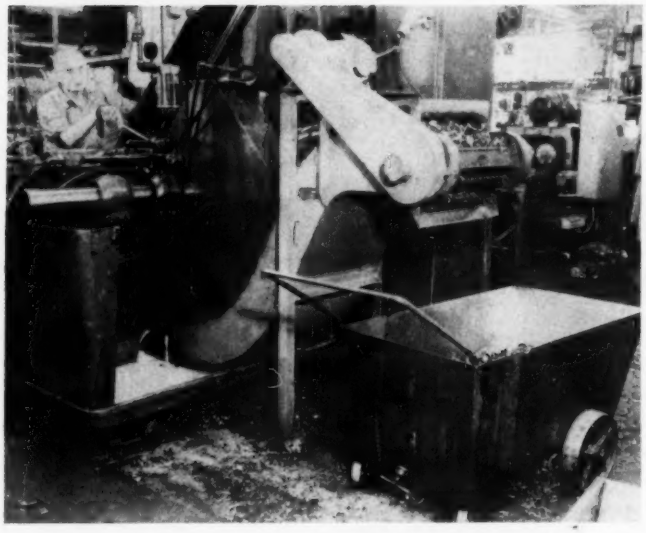
John H. Tacke, former works manager at Kaiser-Frazer Corp., Willow Run, Mich., has been named operations manager, in charge of both automotive and military aircraft production. **John Banks,** who joined K-F in 1946 as chief engineer at Long Beach, becomes works manager in charge of auto production. **Harvey Smith,** who joined the firm in 1947 as plant superintendent at Willow Run, was made works manager in charge of aircraft manufacturing.

Graham B. Brown has been named administrative assistant, Tube Reducing Corp., Wallington, N. J., having left the position of chief of the Iron & Steel Div., Munitions Board.

Frank U. Naughton, Jr., has been named manager, eastern sales div., Hyatt Bearings Div., General Motors Corp., Harrison, N. J. He succeeds **W. L. Iliff** who died Feb. 3.

SHOW IN PRINT

Products shown in this section have not been described previously in our pages. They will be exhibited at the 4th National Materials-Handling Exposition, International Amphitheatre, Chicago, April 30 to May 4



Adjustable Clutch and Hold-Down Feature May-Fran Chip Conveyor

The Chip-Tote conveyor continuously removes metal borings, chips, and turnings from operating automatic or multiple-spindle machines. It thus eliminates the need for periodic shut-down of equipment for manual scrap removal.

Improvements in this conveyor include a formed steel hold-down, which meters the scrap passing up the conveyor belt. The device gradually compresses materials being conveyed into a compact mass to eliminate jamming and prevent fallback of small pieces.

An adjustable clutch had been added to the power source for increased safety. If a load in excess of a preset limit is imposed on the belt, the clutch will slip to prevent possible damage to personnel or equipment. The height of the belt cover has been increased in order to provide greater capacity and permit a freer flow.

The conveyor can be furnished in sizes to fit nearly all machine tools, standard or special, and its speed can be synchronized with a metal-removing capacity as well as the rate of flow of the coolant. The scrap is funneled onto a conveyor belt by a hopper, carried horizontally until clear of the machine's working mechanism, and then transported up a 60 deg incline for discharge into tote boxes or onto a carry-off conveyor.

May-Fran Engineering, Inc., 17th and Clarkstone Road, Cleveland 12, Ohio

Rocket 51 Chain Hoist Lifts With 95.6% Efficiency

V-belt-driven light-weight chain hoist made in 500-lb and 1000-lb models employs a 10½-to-1 gear ratio in a cam-actuated mechanism, driven by a V-belt.

Hoist weight is 79 lb, headroom is 14 in., and lifting speeds are 17, 21, 24, and 34 ipm. Power source is a 220/440-volt, 3-phase, 60-cycle motor. Chain is made from high-carbon steel, and is coiled in the compact housing when not extended.

David Round & Son, Cleveland, O.

Cardboard Packaging Unit →

This combination package unit and pallet is claimed to save up to 33% of the square footage needed for an equivalent amount of parts in regular cartons. It has reusable value in waste-paper scrap when it reaches its destination.

Addison-Semmes Corp., 1800 Thurston Ave., Racine Wis.

G.E. Control-Drive System For Battery Trucks

Utilizing special motors and controls, this system for battery trucks is claimed to reduce power loss, simplify controls, and provide controlled acceleration and anti-plugging features.

The system is said to need a minimum of resistors and speed-control contactors. All size of battery trucks can be equipped.

General Electric, Schenectady 5, N.Y.

Globe Hydraulic Ramp Links Loading Dock with Truck

Self-leveling dock ramp is a power-positioned, hinged "gangplank" which links the loading dock with the bed of the motor truck. One end is hinged to the dock, while the other end can be raised or lowered through a short arc to line up flush. It is said to ride securely on the bed even though spring action varies the truck height.

The ramp may be installed to extend outward from the dock, or recessed into the dock area. In the latter case, because of support by the hydraulic cylinder, the ramp may be positioned flush with the dock floor to allow free cross traffic when the unit is not in use.

Globe Hoist Co., Mermaid Lane & Queen St., Philadelphia 18, Pa.

Armor Patching Material For Concrete Floors

The addition of a finer aggregate is claimed to make this patching material more effective in filling very small cracks.

The material is a dry, cementatious powder made up of pulverized pure-oxidizing metal grains and four different kinds of aggregate, chemicals, and puzzolanic (setting agent) ingredients. The aggregates have the approximate sum of 98% in oxide basilican, iron, and aluminum. This combination is said to produce a surface with unusual resistance to wear, acids, oils, etc.

Shipped as a dry powder, the material is used by applying water and applying in the same manner as concrete.

The Monroe Co., Cleveland 6, Ohio.

Swing-Boom Crane With Front-Wheel Drive

The Krane Kar lifts, swings, carries, and positions loads of any shape or size up to 10 tons—using hook, magnet, or bucket. It has front-wheel drive and rear-wheel steer.

Gas or diesel models are available in four sizes: 1½-, 2½-, 5-, or 10-ton capacity. It can be equipped with solid-rubber or pneumatic tires, 9- to 37-ft booms, or adjustable telescopic booms. Typical applications are moving foundry equipment to and from repair station, handling scrap, unloading freight cars, and handling parts in a machine shop.

Silent Hoist & Crane Co., Brooklyn 20, N. Y.

Small Kalamazoo Tractor Has 2000-lb Drawbar Pull

This small tractor can both haul material in trains or carry it on its platform. Because of its small size and maneuverability, it is claimed to be ideal for crowded, congested areas.

Specifications are as follows:

Engine: Wisconsin Model TF, 2-cylinder, air cooled, 3¼-in. bore x 3¼-in. stoke; 13 bhp at 2600 rpm; high-tension magneto; builtin governor.

Electric starter: 6-volt electric starter and generator; electric horn; electric head and tail lights.

Clutch: 6½-in. dia, single dry plate, tractor type.

Transmission: Warner, Model-T96 heavy-duty transmission, three speeds forward and one reverse.

Jackshaft: Spicer automotive type, spiral bevel drive and differential.

Final Drive: ¾-in.-pitch roller chain from sprockets on brake-drum hubs to sprockets on rear-wheel hubs.

Capacity: 20 ton on roller bearing trailers.

Turning radius: 57 in. left, 62 in. right.

Speed: 10 mph.

Kalamazoo Mfg. Co., Kalamazoo, Mich.

...IN THIS ISSUE

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Powered wheelbarrow carries 1500 lb; has constant-mesh gear transmission .....page 196

Pallet and skid racks are easily erected and dismantled; are not bolted to floor .....page 191

Contour grinder for turbine buckets and blades uses two wheels simultaneously and dresses from single crusher roll.....page 202

Guillotine punch for beam flanges and webs has little buckling on punch and die units.....page 204

Electronic secretary answers phone automatically and takes message or transfers call..... page 208

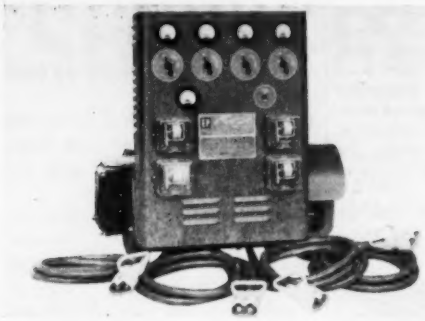
Collet chuck cuts work-handling time on a drillpress, lathe, miller or grinder.....page 210

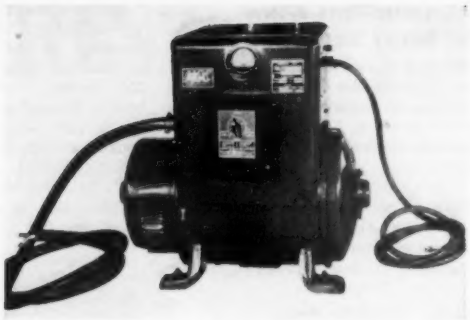
NEW BULLETINS for your Shop Library, including a 72-page catalog on cemented-carbide tools and how to use them ..... pages 199 and 200

...and in April 30

Press unloader has a variety of jaw shapes to accommodate any unusual unloading condition.

Jig borer is so designed that the boring head, cross rail, and smaller column can be locked in any position.





Battery Charger Uses TVR Voltage Relay

Four-circuit charger uses TVR voltage relays replacing a temperature-compensated-battery-voltage relay. The new relay is said to result in closer control of the charging finishing rate and less maintenance.

Other features are a synchronous motor-time clock to automatically end the charging period for each battery, a battery relay that will not operate until a battery is connected to the charger, and a battery-line fuse that guards against short circuits or dangerous overloads on the circuit.

The Electric Products Co., 1725 Clarkstone Rd., Cleveland 12, Ohio

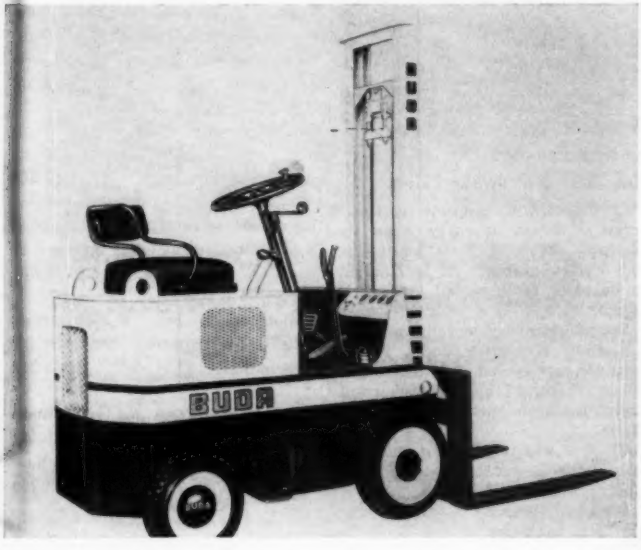
Hobart Battery Chargers Are Controlled Automatically

Taper charging (modified-constant voltage) is used by this motor generator for lead-acid batteries. The taper charge is obtained by balancing the charging voltage against the battery-voltage rise during charge.

The control unit is automatic in operation. The finishing-rate time can be set to any value desired. Batteries of the same cell voltage but of different ampere-hour capacities can be charged by adding additional time to the finishing-rate time.

The starting switch provides overload, undervoltage, and phase failure protection to the motor. By changing links, the motor can be changed from 220 to 440 volts or vice versa.

Motor Generator Corp., Troy, Ohio



Buda Fork-Lift Trucks Have Single-Gear Shift Lever

Shorter length, shorter width, and narrower turning radius are features of improved 2000-lb lift trucks made by Buda. The trucks are available with 24- and 15-in. load center.

A single gearshift lever mounted on the steering column, and a 9¼-in.-dia clutch that is replaceable in 30 min without removing the transmission are other features of the truck.

Known as the models FB20-24 and FB20-15, the trucks are powered with a 4-cylinder, 61-cu-in.-displacement engine and are available in 5 standard masts with a lift of 72, 84, 108, 114, and 120 in. They will climb a 16.9% grade when loaded.

The Buda Co., Harvey Ill.

Tripp Conveyors Add Midget Model; Split Trolley

Innovations on standard materials-handling conveyors include a two-piece trolley assembly fitted with heavy-duty ball bearings and with

plated frame components. The midget conveyor model is for light loads in cramped locations where a standard overhead conveyor cannot be placed.

The split-trolley conveyor model is heavy-duty, for loads from 150 to 450 lb. Connections between trolleys are made with individual lengths of steel cable welded to the drive lugs. Depending upon load requirements, the track supplied can be either T-rail or I-beam. Conveyor speeds range from 6 to 100 ipm.

Trolleys for the midget model are made with one-piece frames and are also equipped with ball bearings. Minimum turning radius is 7½ in.

Triangle Equipment Co., Inc., 45 River Road, Nutley, N. J.

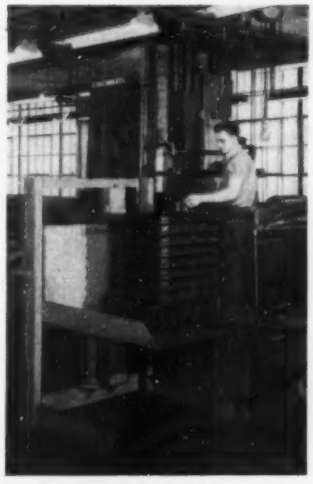
Electric Tiering Truck is Counterbalanced

This counterbalanced tiering truck, called the Jack Stacker, handles suspended loads up to 1,000 lb., 48 in. long, in the same manner as a fork truck. It can be used with pallets, or with free loads. It is made in non-telescopic and telescopic models, and is equipped with rubber - tired wheels.

The truck will move the load along the floor under its own power and raise and lower the load by means of a switch in the handle control. Because of its minimum weight and design and operating features, it is claimed to be able to maneuver in cramped quarters where it is difficult to operate conventional fork trucks.

The vertical handle, which contains all controls, can be kept out of the way by the operator to allow maneuvering in close quarters and narrow aisles.

Lewis-Shepard Products, Inc., Watertown, 72, Mass.



Lewis-Shepard Elevator Lifts Load Electrohydraulically

This addition to the Master line of materials-handling equipment can take loads up to 4,000 lb. It reduces operator fatigue by eliminating bending and lifting operations, since the loads can be kept at a comfortable working height.

Electrohydraulic lifting and lowering is remote-controlled by pedal switches. The lifter can be moved from plate to place by a standard lift truck.

Lewis-Shepard Products, Inc., Watertown 72, Mass.

Variable-Speed Transmissions For Lower Input Speeds

The 150-Series transmissions in sizes from ½ to 1½ hp are designed for operation at input speeds of 1800 and 1200 rpm without spring loading. The lower input speeds are claimed to give cooler, more quiet operation with increased efficiency. Absence of spring loading makes it possible to change the speed of the transmission while running or stationary.

All units in the series are available with motor or with input-shaft extension for coupling to a separate motor or belt drive. All sizes may be had with either standard output of 0.37 x input speed to zero or with a wide variety of types and ratios of built-in gear boxes. These include single-stage spur reducer, double-reduction helical spur reducers, spur-gear setups, and worm-gear reducers with horizontal or vertical shaft.

The units are designed to use standard NEMA C-flange motors of all types—open, totally enclosed, and explosionproof.

Graham Transmissions Inc., 3754 N. Holton St., Milwaukee 12, Wis.

Torque-Converter Drive Added to Tractor Loader

The TL-10 Tracto-Loader features a hydraulic torque-converter drive and a clutch transmission.

The single-stage converter performs the usual function of providing a smooth, constant flow of power to the drive wheels. Loading in a higher gear is possible, operation is easier, and there is less wear on clutches and other parts.

The transmission eliminates most gear shifting through the use of two multiple-disk clutches. One is for forward speeds; the other for reverse. Only one clutch is engaged at a time. Four forward and four reverse speeds are available.

The loader is mounted on rubber tires, has a ¾-cu-yd hydraulically controlled bucket over the drive wheels, and weighs 10,050 lb. Power is furnished by a 40.5-brake-hp gasoline engine.

The bucket of the tractor loading truck is arranged so it is over the larger-diameter driving wheels, not the smaller steering wheels. This is claimed to improve traction and ease steering. The Tracto-Loader is sold through Allis-Chalmers tractor dealers.

Tractomotive Corp., Deerfield, Ill.

Fairbanks Pressed-Steel Casters Eliminate Kingpin

The swivel casters in this line have a Lock-Weld construction and a novel leg design. This construction replaces the conventional kingpin assembly of most swivel casters with a projection-welded structure. This is said to add greatly to the strength and swiveling efficiency of the casters.

The leg design is based on stress-dispersal qualities of a sphere, which gives an evener distribution of a load on the caster, through the leg, into the ball races. Because the load is spread over a greater portion of a ball race, the caster is able to support a greater load. The rigid casters match the swivel casters in height and load rating.

The casters available are:

Swivel: Series 21, single ball race, sizes 2 to 6 in.

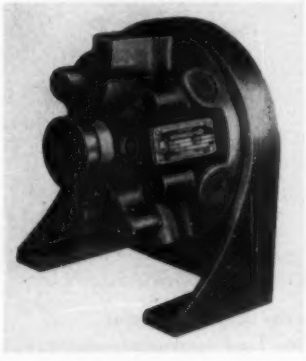
Rigid: Series 31, sizes 2½ to 6 in.

The medium-duty casters are:

Swivel: Series 23, double ball race, sizes 4 to 6 in.

Rigid: Series 33, sizes 4 to 6 in.

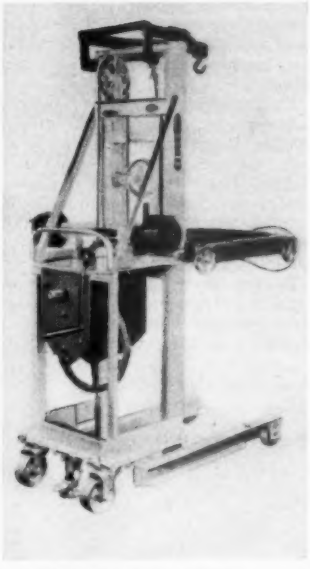
The Fairbanks Co., 393 Lafayette St., New York 3, N. Y.



American Engineering Pump Has Radial Pistons

Constant-displacement pump, known as the Hydramite, has radial pistons. It will deliver pressures up to 5000 psi. An efficiency of 85% without supercharging is claimed. It is direct-driven through a flexible coupling; rotates in either direction; and may be foot-, flange-, or face-mounted.

American Engineering Co., Philadelphia, Pa.



Portable Elevators Handle Heavy Dies and Fixtures

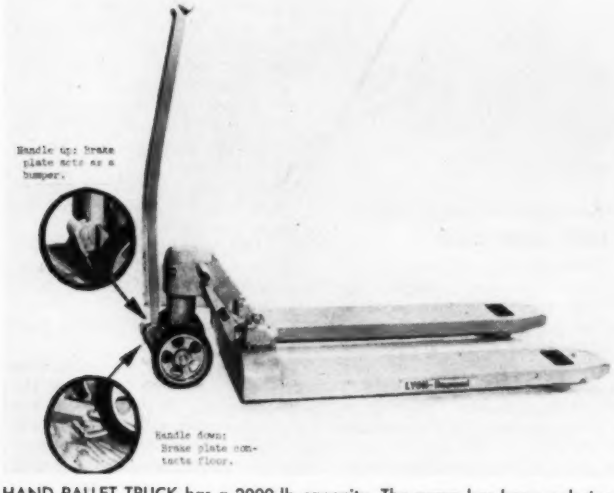
The heavy-duty shop lifter, Type DX, has a compact framework, a crank-hoist unit, and a steel-plate platform large enough to handle heavy dies. Capacity is up to 2000 lb. Two accessories aid in the handling of dies and fixtures.

The first is a winch for sliding heavy dies on or off the platform plate. It consists of a self-locking mechanism geared to two cable drums which are mounted above the hoisting unit. Each drum contains a pulling cable that leads out on one side of the platform plate through pulleys. The drums and cable are mounted on opposite sides of the platform. The self-locking feature permits one man to place a die into an inclined press bed without the necessity of someone holding the load through the winch crank handle.

The second accessory is an "A" boom that can be placed on top of the frame. It has a swivel load hook that supports a chain sling, and in this way dies can be easily separated by hooking the upper part and then lowering the platform plate. It is claimed the boom can be quickly taken off the frame.

The hoist unit is a ball bearing equipped, spur-gear unit. An automatic safety holds the load at the point to which it was raised. The drum is scored for the cable.

Economy Engineering Co., 4519 W. Lake St., Chicago 24, Ill.



HAND PALLET TRUCK has a 2000-lb capacity. The pump has been redesigned, and a combination brake and bumper has been added since the line was last shown.— *Lyon-Raymond Corp., Greene, N. Y.*

Typical thermometer and barometer desk set made by Standard Thermometer, Inc., 952 Dorchester Ave., Boston 25, Mass. Standard's instruments are not only sold to government, industry and over the counter, but many are also imprinted with company names and become valued gifts to top executives of important customers.

Punching spoke holes in brass cups which have been drawn, cut, and passed by Inspection.

TO MEASURE TIME AND WEATHER

BEGIN WITH THE BRASS

● Standard Thermometer, Inc., is a well-known maker of thermometers, barometers, hygrometers, and clocks, for outdoor, desk, and industrial use. Naturally, brass is an important item in these instruments, being used for cases because of its golden beauty and for operating parts because of its reliable physical characteristics, including corrosion resistance.

Fabrication methods include stamping and drawing of cases and bezels. The company is an old and experienced one, dating back to 1885, and has been a Revere customer since that time. Recently it began to experience certain fabrication difficulties. When Revere heard about them, the Technical Advisory Service was asked to look into the matter. The brass being used was analyzed, and factory tools and methods studied. An elaborate 17-page report was prepared, including photographs of micro-sections to show the grain structure of various samples, and detailed recommendations were made. In general, it was found that such things as puckers, orange peel, and flare were due to a combination of factors, including composition of the brass, its temper, the dies, and the lubricant used on them. Standards were set up for metal specification and though Revere does not design dies, suggestions were made for the consideration of the designers.

After digesting the report and putting the recommendations to the proof, Standard wrote: "We are extremely grateful for this information, and it represents a splendid job and one of great value to us."

Perhaps Revere can work with you too on such matters as specification, fabrication, ideas to save precious metal. Our collaboration is freely given.

REVERE 150th YEAR OF SERVICE TO AMERICA

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

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SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

Kalamazoo Speed Truck Has 20-Sq-Ft Deck Area

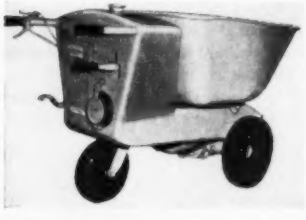
Long loads of rough stock, heavy castings, and miscellaneous loads are carried by model 2500, which has capacity of 1 ton with 10 x 5.00 tires, or 3500 lb with Innacush puncture-proof tires.

The 2-cylinder, 13-hp engine has three forward and one reverse speeds, and can develop a 15-mph speed on the level. A double deck is available (for mounting over the regular platform) to increase deck area to 36½ sq ft.

Wheelbase of the three-wheel truck is 59¼ in.; tread is 33½ in.; brakes are mechanical, internal-expanding type with rigid shoes; clutch is dry-plate with a 6½-in. dia; final drive is roller chain with sprockets; rear axle is 2-in.-dia. dead type; muffler is Walker flame-proof; net weight is 1150 lb. Steering is done with handlebars; turning radius is 64 in.; propeller shaft is fitted with needle bearings.

The truck can be fitted with optional equipment such as: electric starter and generator; horn; headlight; extra-length platform; couplers; and side racks for platforms.

Kalamazoo Manufacturing Co., Kalamazoo, Mich.



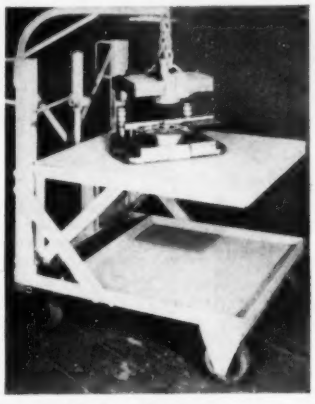
Powered Wheelbarrow Carries 1500 lb

A 5-hp, 4-cycle Wisconsin gasoline engine powers the Model 15 Prime-Mover through an enclosed constant-mesh gear transmission, which eliminates belts, chains, and gear-clashing. Throttle, brake, and clutch are located behind the engine compartment with the steering bars.

The bucket will hold 10 cu ft of liquid, and it can be interchanged with 9- or 14-sq ft platforms. Load-dumping control is through a pedal, which operates the automatic dump-and-return cycle. The mover will run 8 hr on its 4-gal. fuel tank. Overall width is 31½ in. Turning radius is 33 in.

Total weight of the wheelbarrow with bucket in place is 632 lb. Construction is heavy-duty; chassis is designed to protect all mechanical parts from dirt. Gasoline-filler cap is on top of engine housing.

The Prime-Mover Co., Muscatine, Iowa.



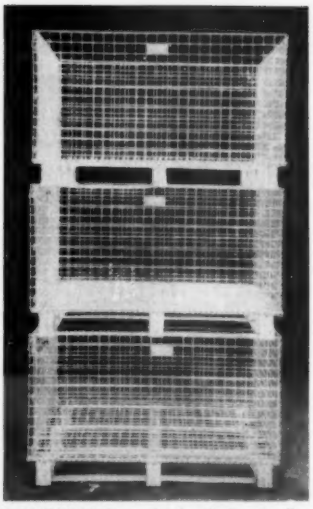
Hydraulic Elevator Operates Rite Hite Die Truck

Elevating platform truck for handling molds and dies has a 29¼ x 32¾-in. table that lifts hydraulically from a 24-in. height to a 41-in. level. A release on the hydraulic jack gives positive control when the platform is being lowered.

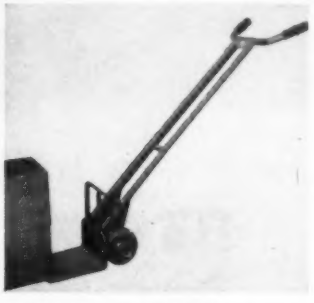
Built like a conventional hand truck with welded construction, the die handler has T-section demountable-rim rubber-tired wheels. It is highly maneuverable with the loaded platform at any height. A die-separating device consists of a swinging boom at a fixed height over the platform. The sling is attached to the upper part of a die when the table is in raised position; then, when the table is lowered, the boom retains the die part to separate it from the lower half.

The boom is removable from its socket and can be carried in the tool tray that is built into the base of the truck.

The Wellington Machine Co., Wellington, O.



CONTAINERS are built of electrically-welded cold-drawn steel wire. The most prominent feature is the fact that visual inventory can be made. The locking legs provide for stacking.— ***Pittsburgh Steel Products Co., Pittsburgh 30, Pa.***



Wellington Carton Truck Moves Tote Boxes, Too

Designed for the express purpose of handling cartons of finished hard goods and similar packages, the small two-wheeled truck will lift and transfer pans and other small loads too heavy for manual lifting.

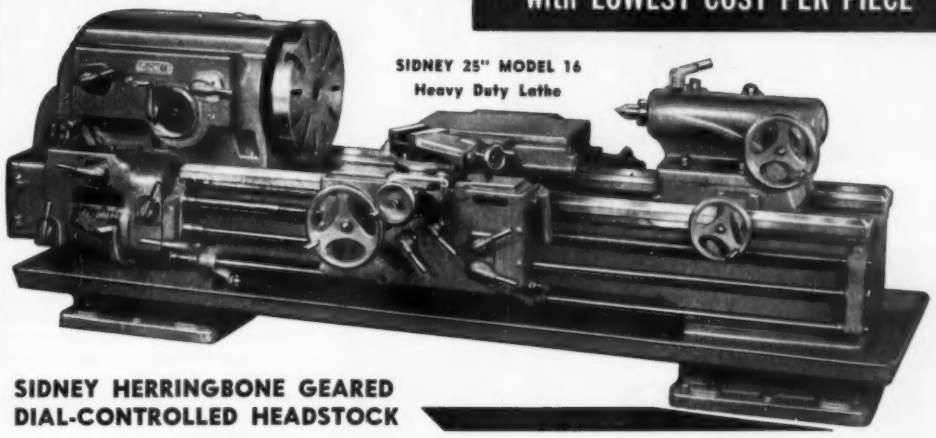
Model 1BZ has 6-in. wheels, a 10-in. shovel-nose lifting plate, and weighs 45 lb. The truck is 10½ in. wide and its handles are 40 in. high. Capacity is rated at 300 lb.

The truck has built-in leverage that allows lifting full load without straining the operator. It is claimed to operate without danger of spilling the load. The chisel nose is easily slid under loads without damaging the truck itself or gashing cartons.

The Wellington Machine Co., Wellington, O.

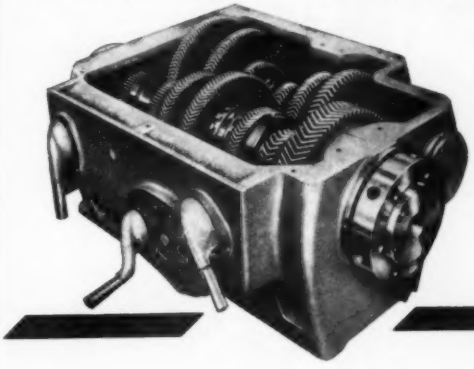
SIDNEY HEAVY DUTY LATHES

Positively
LIKE MONEY IN THE BANK
INCREASED PRODUCTION
with LOWEST COST PER PIECE



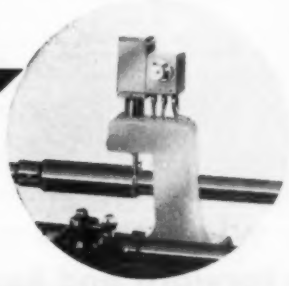
SIDNEY 25" MODEL 16
Heavy Duty Lathe

SIDNEY HERRINGBONE GEARED DIAL-CONTROLLED HEADSTOCK



Assure accurate, economical, speedy production with minimum maintenance attention . . . automatic lubrication is provided to headstock, gear box, apron, carriage bed ways and cross slide. All mechanisms are completely enclosed giving rigid, compact design and top quality product.

Maximum Tooth Contact for Greater Strength and Smoother Action



SIDNEY FLUID TRACER

The all-hydraulic control for reproduction of work pieces from flat or round template or regular lathe work without limiting range. It eliminates single purpose tools . . . saves on original investment. No parts to replace or remove for change-over to standard lathe operations.

A complete line of **LATHES**

Precision Tool Room Lathes . . . Production Lathes . . . Gap Lathes . . . Engine Lathes . . . Special Equipment . . . Heavy Duty Coil Winding Machines

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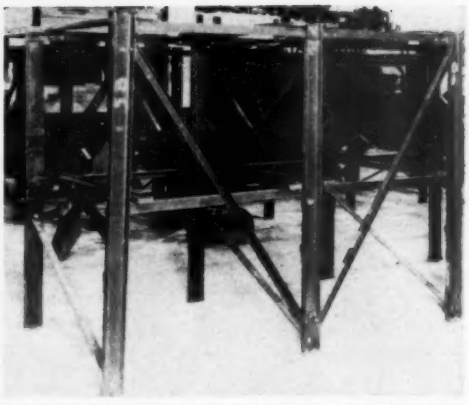
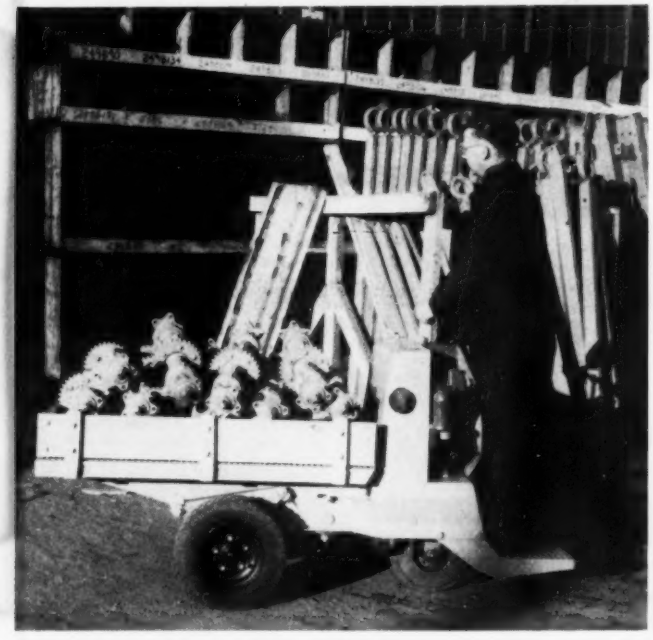
BUILDERS OF PRECISION MACHINERY SINCE
1904



PALLET AND SKID RACKS give individual selection of unit loads. Said to be easily erected, they are not bolted to the floor. Can be added to or dismantled and re-erected in another location with little cost.—*Fab-Well Corp., Pickwick & Richmond Sts., Philadelphia 34, Pa.*



Shop Wheelbarrow Has Power Both Forward and Reverse

The hauling of castings, sand, coke, scrap, or any other material can be handled by this wheelbarrow at speeds from 1½ to 4 mph. The 4-hp, 4-cycle gasoline engine is powerful enough to take a full load up 20% ramps and grades. Direct steering is used to the dual rear wheels. The large steering wheel has a 33.6-to-1 gear ratio. Dual steering wheels are standard; driver's riding step, optional.

Interchangeable attachments with which the barrow can be equipped are: (1) Hopper body for holding 10 cu ft of bulk materials with gravity dump. (2) Flatbed platform carries 1200-lb load on 32 in.-by-4 ft bed. Platform tilts for loading. (3) Adjustable fork lift for pallets, boxes, barrels, and other bulky objects. Hydraulic-pump operated with forks adjustable in width. (4) Scraper blade attaches without removing hopper body, and sets at any angle. It is supported by a swivel shoe at each end.

Kwik-Mix Co., Kearing Subsidiary, Port Washington, Wis.

Skarnes Hydraulic Lifter

The model M-2-H Roll-A-Lift augments an older 2000-lb-capacity mechanical lift. Improvements include a higher lift that has been made hydraulic, lighter weight, and rubber tires. It has a 5⅛ in. lift, and is, in general, used for lighter loads than the preceding model.

Skarnes Engineering & Supply, Inc., 2907 E. Franklin Ave., Minneapolis 6, Minn.

FYI

FOR YOUR INFORMATION

***FREE** Catalogs, Booklets, Charts, Calculators*

FYI—these initials symbolize information that's important. And there is much of importance in the literature listed here. To get the ones you need, all you do is fill out one coupon for each booklet you wish to order. Indicate in the circle on the coupon the number of one catalog wanted. When you have filled out a card, detach, stamp, and mail. We'll do the rest.

MACHINES AND ATTACHMENTS

1 BORING MACHINE—*Forney's Inc., New Castle, Pa.* 16-page booklet illustrates and describes a horizontal boring and facing machine that eliminates boring-bar overhang by allowing the head to travel on a crossrail.

2 HYDRAULIC PRESSES—*The Hydraulic Press Mfg. Co., Mt. Gilead, Ohio.* 12-page catalog describes press operations for deep-drawing, forging-die straightening, coining, shell-nosing, etc. Includes installation photos of actual production work.

3 GRINDING MACHINE — *The Cleveland Grinding Machine Co., Cleveland 3, Ohio.* 4-page bulletin describes and gives specifications for the Visual-Grind, a contour grinder using an 18x18-in. image screen.

4 POLISHING EQUIPMENT — *The Manderscheid Co., Chicago 7, Ill.* 6-page folder illustrates and describes such polishing and buffing accessories as backstand idlers, buff chucks, and balance weights.

5 GEAR HOBBER—*Curt Hirschmann Co., Manhasset, N. Y.* 4-page folder gives details on a semi-automatic vertical hobber used in making small instrument gears.

6 INCLINABLE PRESSES — *Perkins Machine Co., Warren, Mass.* 4-page bulletin includes specifications, drawings, and description of the model B, No. 650 inclinable press.

TOOLS AND ACCESSORIES

7 CARBIDE TOOLS—*Kennametal Inc., Latrobe, Pa.* 72-page catalog 51 gives specifications and prices on complete line of cemented-carbide tools. Engineering data given includes recommended grades for different materials and types of cuts, and suggested cutting speeds on steel of varying hardnesses.

8 CUTTING OILS—*Sun Oil Co., Philadelphia 3, Pa.* 80-page booklet, "Cutting & Grinding Facts" gives cutting speed, feed, tools, and recommended cutting oil for more than 50 typical metalworking jobs. Another section describes the company's straight and emulsified oils.

9 COLLETS AND PUSHERS—*Allen Collet Mfg. Co., Inc., Melvindale, Mich.* 17-page catalog gives specifications and prices on collets, feeders, pushers, and pads for various makes of automatics and turret lathes.

10 SPEED RECORDERS — *Leeds & Northrup Co., Philadelphia 44, Pa.* 20-page catalog on Micromax and Speedomax recorders describes for the first time the application of Speedomax to recording, and tachometers for use with both types.

11 OILERS—*Eynon-Dakin Co., Detroit 6, Mich.* 8-page catalog B-3 illustrates and describes oilers, vents, caps, and tube forms. Gives engineering drawings and specifications.

12 TESTING MACHINES — *Riehle Testing Machines Div., American Machine and Metals, Inc., E. Moline, Ill.* 30-page catalog includes illustrations, construction details, specifications, and dimensions of Screw-Power testing machines up through 400,000 lb capacity.

13 LUBRICANTS—*The Brooks Oil Co., Pittsburgh 12, Pa.* 24-page brochure on the company and its products. Details are given on the company's lead-base lubricants such as Leadolene, Klingfast, and Roll-Oil F. Over 24 case histories are cited.

14 CARBIDE TOOLS—*The Atrax Co., Newington 11, Conn.* 20-page catalog shows a line of solid tungsten-carbide rotary files, reamers, end mills, boring bits, grinding tools, knurls, drills, and countersinks.

15 WELDING ALLOYS — *All-State Welding Alloys, Co., Inc., White Plains, N. Y.* Wall chart aids welders in selecting the particular welding, brazing, soldering, cutting, or tinning alloy and flux for the job at hand.

16 BRAZING—*Ajax Electric Co., Inc., Philadelphia 22, Pa.* 4-page bulletin describes a salt-bath brazing process being used for steel, cast iron, brass, bronze, copper, and aluminum assemblies.

17 SPOTWELDERS — *Progressive Welder Sales Co., Detroit 24, Mich.*

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York

FILL IN BELOW NUMBER OF ONE CATALOG WANTED

Not good after June 16, 1951

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(duplicate)

FYI — For Your Information

4-page bulletin on spotwelders for aluminum and alloy steels. Three-phase system and an anti-friction head are features.

PLANT-SERVICE EQUIPMENT

18 LIGHTING—*General Electric Eng. Div., Lamp Dept., Cleveland 12, Ohio.* 48-page catalog called "Planned Lighting for Industry" gives information on the lamps best suited for the particular location, describes the different types of lamps, how much light should be used, etc.

19 BLAST CLEANING — *American Wheelabrator & Equipment Corp., Mishawaka, Ind.* 28-page brochure illustrates and describes how this airless blast equipment can be applied to 39 production cleaning problems.

20 STRADDLE TRUCKS—*Hyster Co., 1800 N. Adams St., Peoria 1, Ill.* 16-page catalog gives construction features, specifications, and typical examples of the uses for this truck.

21 MAINTENANCE BY METALLIZING—*Metallizing Co. of America, Chicago 24, Ill.* 20-page bulletin on the Mogul metallizing gun shows how this equipment aids in fighting corrosion, rebuilding worn parts, and in reclaiming castings.

22 COPYING MACHINES — *Charles Bruning Co., Inc., New York 13, N. Y.* 8-page booklet describes how the Copyflex and other Bruning machines can speed up paper work.

23 PIPE-LINE FILTERS — *Dollinger Corp., Rochester 3, N. Y.* 8-page bulletin describes, illustrates, and gives applications and specifications for 75 filters, including pressure and vacuum types.

24 FLOOR SURFACING—*The Monroe Co., Inc., Cleveland, Ohio.* Bulletin describes an improved material, Swift Floor, over which traffic can roll within 60 seconds after application.

25 INDUSTRIAL SCALES — *Detecto Scales Inc., Brooklyn 6, N. Y.* 4-page bulletin describes and illustrates scales for check weighing, packaging, shipping, test weighing, and counting.

26 FLOOR CONVEYORS—*Jervis B. Webb Co., Detroit, Mich.* 90-page catalog contains information on conveyor chains, chain-on-flat and chain-on-edge floor conveyors, and a variety of pusher dogs used in connection with them.

27 FLOOR MATERIAL—*The Monroe Co., Inc., Cleveland 6, Ohio.* 4-page bulletin lists laboratory tests on and describes a resurfacing and patching material for concrete floors.

28 DUST SUPPRESSORS — *Whiting Corp., Harvey, Ill.* 4-page bulletin illustrates and describes a bag-type suppressor that is said to be effective against dust, fumes, and smoke.

29 MAGNETIC CONVEYOR — *Eries Mfg. Co., Erie, Pa.* 4-page bulletin explains new principles in conveying skelp, plate, sheet, rod, bar, pipe, and other shapes through magnetic-conveyor elements.

30 WIRE ROPE—*John A. Roebling's Sons Co., Trenton 2, N. J.* 4-page bulletin illustrates and describes Preformed wire rope and its advantages.

31 WATER SOFTENERS — *Cochrane Corp., Philadelphia, Pa.* Bulletin 4820 explains the sodium-zeolite softening process, selection of zeolite material, the four steps of operation, etc.

PARTS AND MATERIALS

32 JIC HYDRAULIC STANDARDS—*Miller Motor Co., Chicago 18, Ill.* 16-page booklet gives the revised JIC Hydraulic Standards for Industrial Equipment. Also includes a sample circuit, and a glossary of terms.

33 FLUID COUPLINGS—*The Hanson Mfg. Co., Cleveland 11, Ohio.* 48-page catalog on quick-connective couplings gives complete information, engineering data, dimensions, and other data.

34 SPEED REDUCERS—*D. O. James Gear Mfg. Co., Chicago 7, Ill.* 56-page catalog covers type-H-worm, helical-worm, and double-worm-gear speed reducers.

35 WASHERS—*George K. Garrett Co., Inc., Philadelphia, Pa.* 32-page catalog gives specifications, drawings, and complete data on lock washers, lock nuts, small stampings, C-washers, retaining rings, etc.

36 AIRCRAFT HOSE — *Resistoflex Corp., Belleville 9, N. J.* 12-page catalog gives information for the application of Resistoflex aircraft hose, hose fittings, and assemblies.

37 VALVES—*Barksdale Valves, Los Angeles 11, Calif.* 48-page catalog covers a range of shut-off, selector, and manipulator Shear-Seal valves for any fluid.

38 STEEL PARTS—*Henry Disston & Sons, Inc., Philadelphia 35, Pa.* 16-page booklet tells the story of a custom-made steel-parts plant and its products.

39 STAINLESS TUBING—*The Babcock & Wilcox Tube Co., Beaver Falls, Pa.* 4-page bulletin outlines the characteristics of three non-hardening straight-chromium stainless tubing steels.

40 ROLLER CHAIN—*Chain Belt Co., Milwaukee 4, Wis.* Handbook describes roller chain for Tension Linkage, that is, any application in which linear movement of the chain is not continuous in any one direction.

41 ALLOY STEELS—*Republic Steel Corp., Cleveland 27, Ohio.* 16-page booklet explains through 7 case histories how Republic has helped customers to increase production and cut costs by proper specification of alloy steels.

42 OIL PURIFIERS — *Hoban-Crane Corp., Lebanon, Ind.* 8-page bulletin shows how hydraulic-oil purifiers with Cranite filtering medium remove contaminants and describes the equipment.

43 ROLL-FORMED SHAPES — *Roll Formed Products Co., Youngstown, Ohio.* 8-page catalog describes facilities for engineering and producing roll-formed shapes from ferrous and non-ferrous metals.

44 MINIATURE BEARINGS — *Miniature Precision Bearings Inc., Keene, N. H.* 12-page catalog describes and specifies more than 70 different types and sizes of miniature ball bearings.

45 BRIGHT FINISHING—*Allied Research Products, Inc., Baltimore, Md.* Bulletin on the use of Iridite chromate chemicals and zinc plate to replace conventional chrome plating in bright finishing.

MISCELLANEOUS

46 TEMPLET SHEETS—*Stewek Tool Co., Detroit 2, Mich.* Set of full-size templet tracing sheets covering rack-and-pinion and spring-type drill jigs. Request must be on company stationery.

Reader Service Department
American Machinist
330 W. 42nd St.
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. . . dozens of man-hours— by a few minutes of Radiography

THERE'S a lot of skilled machinist time invested between a cast bronze blank and a finished precision gear. And it's time all lost when you wait until the cutting tool exposes a gas hole or other irregularity in the casting causing rejection.

Nowadays that time can be saved—saved by first proving the casting sound—by Radiography. Foundries that do this can be certain that only high-quality castings are released. And this is the basis for an enviable reputation. What's more, radiography often suggests changes in casting methods which increase the yield in production runs.

Get in touch with an x-ray dealer. Ask him to give you more details on how Radiography can better your foundry operations and increase production. Send for a free copy of "Radiography as a Foundry Tool."

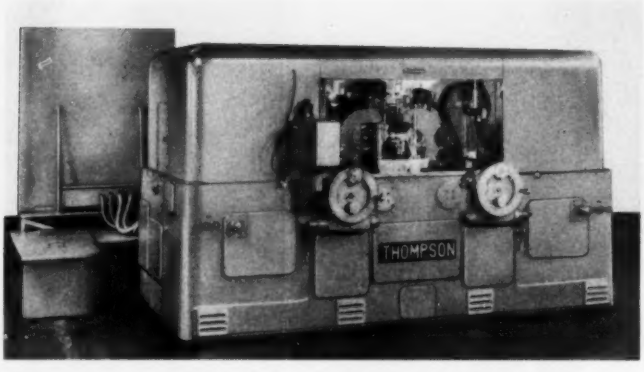
EASTMAN KODAK COMPANY
X-ray Division **Rochester 4, N. Y.**

Radiography . . .

another important function of photography

Kodak
TRADE-MARK

New Shop Equipment Materials and Parts



Thompson Double-Wheel Grinder For Jet-Engine Buckets and Blades

Workpiece capacity	3 in. long, 1 in. wide
Grinding wheels	14-in. dia x 1-in. face x 5-in. hole
Spindle speed	1800 rpm
Vertical work speed	3 to 84 ipm
Max. stock removal per wheel with automatic cycle	0.150 in.

Automatic contour-grinding using two wheels simultaneously and dressing from a single crusher roll is claimed to give perfect symmetry in machining the root sections on gas-turbine buckets.

A typical bucket is approximately 2 in. long with 150 in. stock removal per side from the rough to the finish size. Where shape and size variations of the bucket or blade contour are not excessive, the part may be held in an adjustable matrix holding block.

Hood doors, work clamps, coolant flow, and grinding cycle are actuated in automatic sequence from a centralized control panel at the right-hand side of the machine.

One method of production used with buckets requires two operations. The operator loads the work-holding block into the machine and starts it —time—4 sec. The piece is then automatically ground to within 0.005 in. of finish size with a total infeed of approximately 0.145 in. for each wheelhead. The grinding cycle time is 84 sec. The machine will then come to a stop, open the doors, and the operator remove the block. Two sec. are required, making a total of 90 sec. per block, floor to floor. Finish-grinding sequence is the same, with a total time of 45 sec. for the operation, floor to floor. The advantage of using this method is better control of finish and size. The operator would crush the wheel every 5 buckets. The time required is 30 sec. The crusher roll must be reground after every 10 crushings, with a required time of 4 min.

A second method of operation employed is grinding from rough to finish size in one machine setting. It has the advantage of slightly faster production. The operator loads the workpiece into the machine, requiring 4 sec. The machine cycle in this case would be 104 sec for the removal of approximately 0.150 in. total infeed for each head. The unloading time would be 2 sec, making a total of 110 sec floor to floor for grinding to finish size.

Thompson Grinder Co., Springfield, Ohio.

Safag Automatic Pinion Cutter

This automatic wheel-, pinion-, and segment-cutting machine has been developed for parts ranging from 0.012 to 0.5 in. in dia. Maximum length of parts is 0.5 in. Known as the No. 118 Type IA, it is of the indexing type, with one or two cutters, and is available with or without magazine feed.

Two cutters on the same spindle are used for cutting pinions with fragile, small pivots, for components made of hard material, or with special tooth shapes. The first cutter is for roughing, the second for finishing the teeth. Work is held to tolerances of plus-minus 0.00005 in. depending upon the material and the requirements of the job. Max module (metric) in steel is 0.30, in brass 0.50, and max. tooth length is 0.5 in. The machine generates gears and pinions of 6 to 60 straight teeth in one cut.

The cutter spindlestock which forms a tilting bracket, is mounted on a cross-slide. It automatically moves to bring the two cutters alternately into their working positions.

Special equipment includes an automatic feed magazine, which mounts on the cam shaft. It operated while the cutter slide reverses, thus there is no cycle time spent in feeding. For cutting wheels, arbors held between centers are used. The quantity of wheels that can be fixed on the arbor is determined by their thickness and the stroke of the cutter slide. Max. stroke of the slide is 0.5 in.

Carl Hirschmann Co., 30 Park Ave., Manhasset, N. Y.

World's finest and fastest hole producer

LELAND-GIFFORD
No. 2LMS
Motor Spindle Drilling Machine

In the range where both quantity and quality count — holes from 1/16″ to 3/4″ — the Leland-Gifford No. 2LMS has earned an unqualified reputation for fast, accurate, economical production. Available in any combination of spindles from one to six; swings of 14″, 20″ or 26″; and speeds up to 3600 RPM, it offers a basic machine which we can readily adapt to your specific needs.

Write for Complete Information

PRECISELY ADAPTED TO YOUR NEEDS

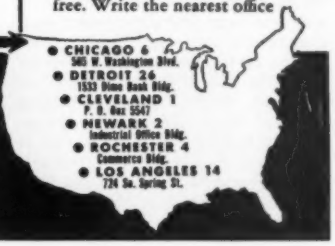
Production drilling **Reaming**	Sensitive hand lever feed with ratchet adjustment or semi-automatic power feed with three feed rates and positive, adjustable depth stop.
Facing **Deep hole drilling**	Plain or Step-by-Step hydraulic feed with infinitely adjustable feed rate and automatic overload release.
Tapping	Reversing motor or high speed, ball bearing friction attachments for tapping at drilling speeds.

PRODUCTION MEN

Get this Handy Slide Rule

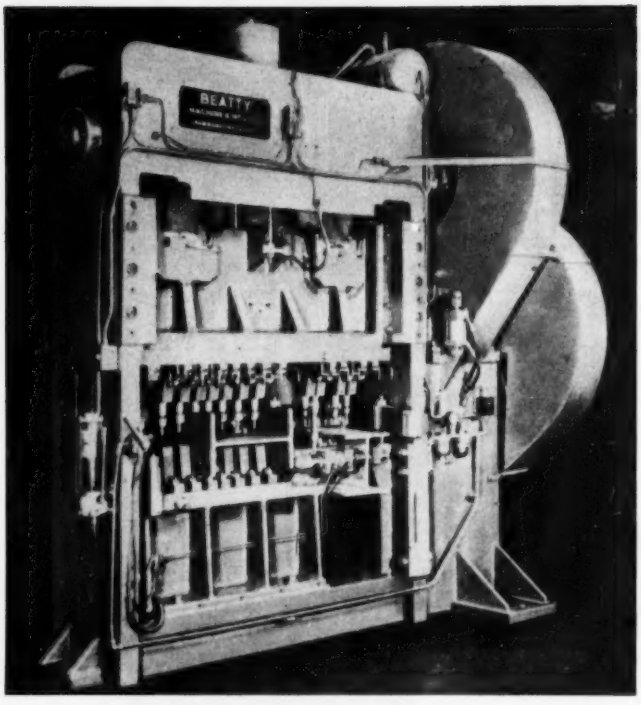
A valuable aid in figuring costs and setting production schedules. Quickly gives time required to drill holes of any size and depth in any material. It's free. Write the nearest office

SAVE TIME — **CONTACT THE OFFICE NEAREST YOU**



LELAND-GIFFORD
Drilling Machines

WORCESTER 1, MASSACHUSETTS, U.S.A.



Beatty Guillotine Punch For Beam Flanges and Webs

The guillotine design of these punches is claimed to have the following advantages: deflection is straight up and does not cause a buckling effect on punch and die units, rigidity is greater, alignment more accurate. The punch illustrated, of 200-ton capacity, will punch four 15/16-in.-dia holes through 11/16-in. mild-steel plates. Additional holes are punched by staggering the lengths of punch stems. Die levels are the same for punching both flanges and webs, enabling the user to punch wide plates the full length of the ram.

The machine illustrated is complete with bolsters, 4-punch units for flange punching, 8-punch units for web punching, and air-cylinder positioners for web and flange punch gaging of the beams. Strippers are adjustable for different thicknesses of metal. Motor drive is V-belt to flywheel face. Drive-shaft bearings are anti-friction type. Lubrication is either by oil cup or is centralized, manually operated. A full punching load may be taken at either end or at the center of the ram.

Clutch operation is by means of push-button-controlled solenoid air valve and cylinder. The punch is available in three sizes, No. 8 for beams up to 24 in., No. 9 for beams up to 30 in., and No. 11 for beams up to 36 in.

Beatty Machine & Mfg. Co. Hammond Ind.

Fairbanks-Morse Induction Motors Conform to NEMA Standards

Line of Type QZE, totally enclosed, non-ventilated, squirrel-cage induction motors made by Fairbanks-Morse include continuous-duty ratings built in NEMA standard frame 284. The motors available include 7½ hp, 1800 rpm and 5 hp, 1200 rpm.

These motors conform to NEMA and ASA standards for totally enclosed models, and are identical in mounting dimensions with standard totally enclosed, fan-cooled motors of the same ratings. They are suited for service in adverse locations where dirt, dust, lint, metal turnings, and sand are prevalent, since there are no ventilating openings to clog.

Rotors are the company's "Copperspun." Cartridge ball bearings are used, with ample grease space to permit sealing for the life of the bearing if desired, but with provisions for easy flushing and regreasing.

Fairbanks, Morse & Co., Fairbanks-Morse Bldg., Chicago 5, Ill.

Westinghouse Motor Starter Protects Operating Personnel

The Motor Watchman, Class 10-100-S1, is available with ratings up to 600-v, 7½-hp polyphase, 5-hp single phase, or 220-v, 1½-hp dc. It starts, stops, and also provides overload protection for the three types of motors.

The self-indicating handle, interlocked cover that prevents opening unless starter is off, and safety latch to lock starter off during servicing are personnel-protection features.

Positive motor protection is provided by the quick-make, quick-break, over-center toggle mechanism, by De-ion arc-quenching, and by the bimetallic disk-type thermal overload relay.

Straight-through wiring is designed to facilitate installation and servicing, and Bonderized enclosures prevent blistering, flaking, and corroding.

Westinghouse Electric Corp., P.O. Box 2099, Pittsburgh 30, Pa.

Hjalmar Ellstrom

INVENTOR OF THE GAGE BLOCK

The achievement of perfection . . . the complete mastery of any art or craft or science . . . is a rare human accomplishment. A discovery or an invention that contributes to the progress and total welfare of all mankind is rarely the heritage left by a single man. So rare is it, indeed, that in such infrequent instances, the true facts surrounding its origin are often distorted, obscured, or even lost in the conflicting claims of others who would seek the personal worldly gains to be derived from undeserved fame.

So it was with the Gage Block. For, actually, this basic standard of measurement now used the world around was originally conceived, developed, and invented solely and entirely by . . . Hjalmar Ellstrom.

Here, briefly, is the story of his accomplishment: During the early 1890's, Hjalmar Ellstrom was employed by the government rifle factory at Eskilstuna, Sweden. He was a master craftsman . . . a man of infinite patience who took great pride in his work. He was a man of vision, too, who recognized the limitations imposed upon industry by the lack of sufficiently accurate measuring devices. So, with a then unheard of standard of precision as his ultimate goal, he alone developed and perfected his checking instruments and techniques . . . then alone he created the world's first gage block accurate to the infinitesimal millionth part of an inch.

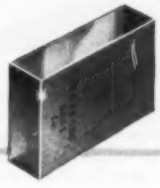
Today, though his achievement has been copied and imitated by others, his personal unqualified devotion to accuracy is the exclusive heritage of Ellstrom.

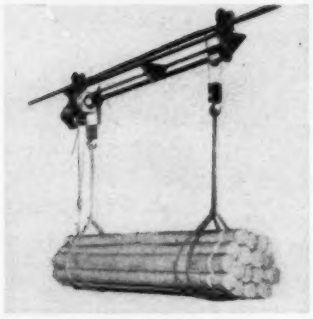
ELLSTROM . . . *measuring in millionths for three generations*

DEARBORN GAGE COMPANY

22035 BEECH STREET • DEARBORN, MICHIGAN

Originators of Chromium Plated Gage Blocks



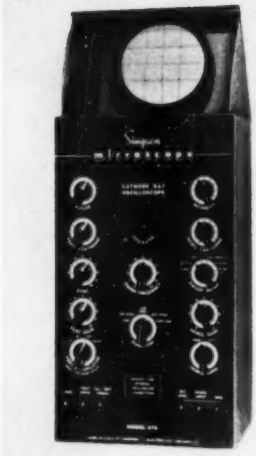


Double-Hook Hoisting Unit Fits Any Size Track

Equipped with reversing motor, trolley, and cable and hooks, this unit will handle long items in quantity and lift and control dumping of heavy barrels or drums of powdered material, liquids, castings, and small stampings.

It will fit any size tub when handling loose material. Capacity is 500 lb at 25 fpm or 250 lb at 50 fpm. Hooks are regularly spaced 48-in. apart, but can be adjusted for lesser distance or specially furnished with hooks up to any distance apart. It is supplied with swivel and adjustable trolley wheels to fit any size or make of track and will travel any size curve. Speed changes from 54 to 500 rpm are possible by changing the pulley size.

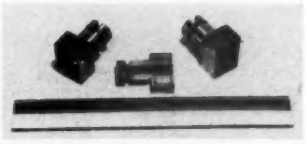
Flinchbaugh Co., York, Pa.



Simpson Space-Saving Oscilloscope

The Model 476 Mirrorscope is designed to save space on the testing bench. The 5-in. cathode-ray tube is mounted in a vertical position, thus reducing bench requirements to an area of only 9x8 in. The tube image is reflected from a mirror mounted in the adjustable cover at the top of the cabinet. Mirror and wing sides at top fold into the cabinet when not in use. Height is 16¼ in. with a width of 9⅛ in. Dealer's price is $179.50.

Simpson Electric Co., 5200 W. Kinzie, Chicago, Ill.

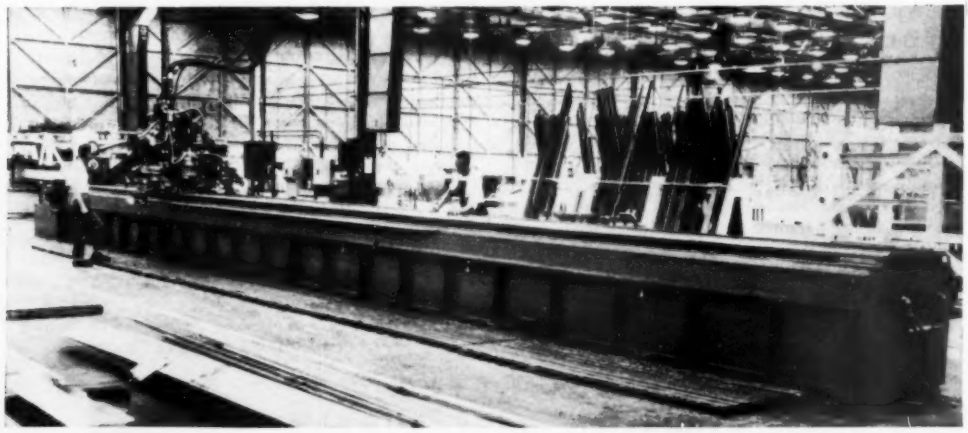


Sine-Fixture Key Eliminates Keyway-Slot Milling

Expensive, time-consuming milling of keyway slots in fixtures is eliminated by use of this sine fixture key. In the same setup used for boring the locating points, standard size holes are bored and reamed to accept the round body of the key. This is claimed to insure perfect alignment with the locators, and do away with the necessity of lining up the fixture for milling slots. The key is held in place by an expander on the shank end which affords sufficient pressure to retain it, yet permits it to be rotated for perfect alignment with the table key slots.

Stepped keys are not necessary when the fixture is to be moved from one machine to another, because seven different key widths are available on the 0.625-in.-dia shank, and four widths on the 0.750-in.-dia shank. Sizes available on the small shank are 0.4995, 0.562, 0.6245, 0.687, 0.7495, 0.812, and 0.8745. On the large shank sizes are 0.937, 0.9995, 1.062, and 1.1245. Concentricity is guaranteed within 0.0005 in.

Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, Ohio



MILLING MACHINE for use in aircraft production on extrusions, sections, and billets of aluminum or other non-ferrous metals. Spindle- and carriage-feed speeds range from 24 to 190 ipm. Each of the two spindles are arranged for individual horizontal hydraulic templet control and Farnham templet control for vertical motion. Both heads may be actuated in both directions from 4 individual templets at the same time. Each spindle also has manual adjustment for the movements as well as swivel adjustment of 15° each side of vertical center. Length of bed is 60 ft, with max. work length equal to 55 ft.—*Farnham Mfg. Div., Wiesner-Rapp Co., Inc., 1600 Seneca St., Buffalo 10, N. Y.*

Putting on the FINISHING touch is a cinch...

MAGNESIUM

Yes, putting a protective finish on magnesium can be done easily, economically and with satisfactory results. The procedures used do not differ greatly from those employed with other metals. After thorough cleaning, a chemical finish is applied and this is followed by the desired paint coating. The important considerations are the proper choice of chemical treatment and paint materials.

Dow has exposed thousands of paint test panels to determine the best paint materials and the most efficient complete paint systems. As a result, paint systems are available which meet normal requirements and combine adequate protection with attractive decorative characteristics. Detailed recommendations are available for conditions under which magnesium is used in service ranging from baked enamel systems for office machines to weather resisting air dried primers and finishes for truck bodies and trailers.

For complete information on finishing methods call your nearest Dow sales office or write direct.

Painting provides both a protective and decorative finish.

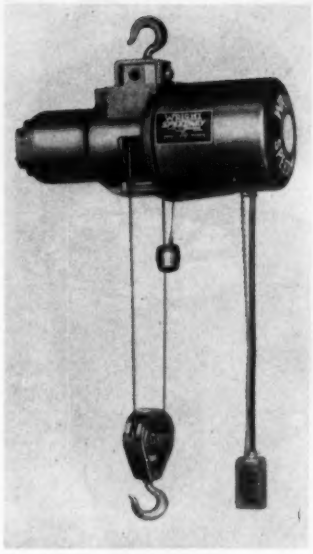
When decorative finishing is desired, chemical treatments, electroplating and a myriad of novelty paint finishes are available.

Magnesium Division, Dept. MG44

THE DOW CHEMICAL COMPANY

MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Atlanta • Cleveland
Detroit • Chicago • St. Louis • Houston • San Francisco • Los Angeles • Seattle
Dow Chemical of Canada, Limited, Toronto, Canada

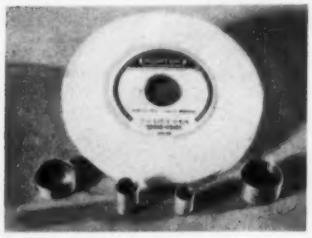


Wright Electric Hoists Made with Shorter, Deeper Drum

A line of Frame B Speedway electric hoists is available in capacities from 250 to 1000 lb. They are made with a shorter, deeper drum that is said to make them lighter and better balanced. They are otherwise similar to the Frame 1 hoists made by the company.

As the highest capacity offered is 1000 lb, the hoists use two parts of 3/16-in. Trulay cable, a smaller load hook, and a smaller trolley.

Wright Hoist Div., American Chain & Cable Co., Inc., Bridgeport 2, Conn.



Bushings for Norton Grinding Wheels

These bushings are said to have several distinct advantages over poured lead bushings. Because they are press-fitted on the wheel, they are claimed to have better holding power. Their lightweight and uniformity of size preserve the balance of the wheels. They are also claimed to maintain more consistent hole size from wheel to wheel.

The bushing is being used in straight wheels from 5 to 8 in. in dia. They will soon be extended to wheels of other shapes and sizes.

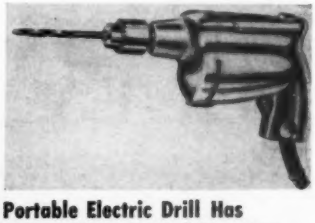
Norton Co., New Bond St., Worcester 6, Mass.

Electronic Secretary Answers Phone Automatically

When the man in the shop is unable to leave his work or when the office phone is unattended, this automatic machine answers the phone, takes messages, and tells the caller when he will return. In case of an emergency at night, the caller is told where this official can be reached. The unit can also serve as a portable dictation machine.

Electronic Secretary Distributors, Inc., 803 W. National Ave., Milwaukee 4, Wis.

ONE HUNDRED CYLINDER BLOCKS per hour are drilled, tapped, spotfaced, and reamed on this 13-station machine. A cleaning unit at Station 11 vibrates and rotates the work 360° to remove all chips from the holes before inspection and tapping. At Station 12, an automatic inspection unit stops the machine if the holes are not drilled to proper depth for tapping.—*The Cross Co., Detroit 7.*



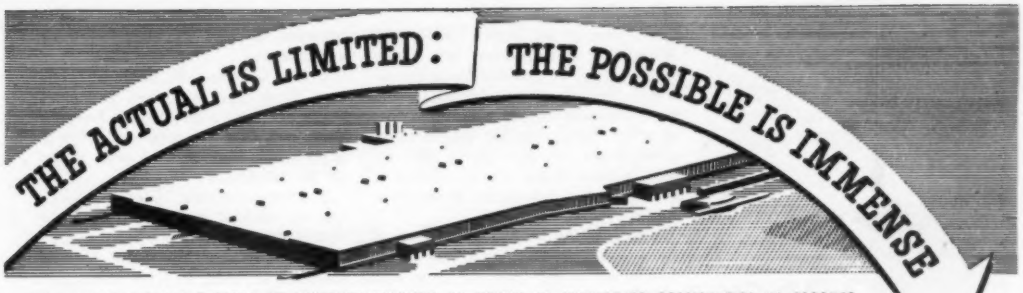
Portable Electric Drill Has Vacuum-Impregnated Armature

The Desoutter ¼-in. portable electric drill gun, Model S2, operates at a free speed of 1600 rpm. Power consumption is 180 watts and it can be used on any ac or dc supply.

The motor is a universal type for ac single-phase up to 70 cycles, or dc, with shielded ventilated system to ensure cool running. The armature is impregnated while in a vacuum, thus reducing the chances of air pockets and uneven coatings. It runs on pre-loaded ball bearings which automatically maintain their adjustment. Silk-taped coils are wound on the armature using a hand former.

A Jacobs key chuck and a deadman trigger switch with locking button are other features. Generated helical gears of heat-treated chrome-molybdenum steel are employed.

Newage International, Inc., 235 E. 42nd St., New York 17, N. Y.



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1951

DESIGNS THAT UTILIZE THE ECONOMIES OF WELDED STEEL ARE ALWAYS LOWER IN COST

1 There is a 2 to 1 advantage pound per pound between the cost of steel and iron.

2 Considering both strength and safety factors, there is an additional 4 to 1 advantage with steel.

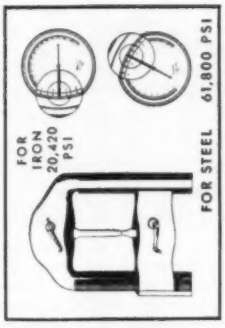
3 The design advantages are unlimited. Through ingenuity,* the designer is better able to locate the stronger materials in strategic areas, achieving maximum load-carrying capacity per pound of metal.

4 Production efficiency is greater. The shop can fabricate economically in any quantity . . . with a minimum of equipment and setup cost.

A Challenge to Industry

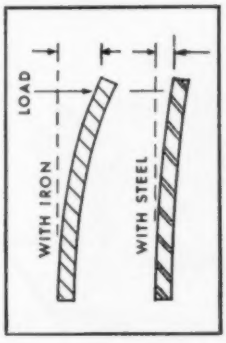
The greater potential economies possible with welded steel originate with design. To utilize the full benefits of steel requires new concepts in mechanics and appearance. Your Lincoln Welding Engineer can show you how to achieve these benefits in your designs . . . to build better products from less material at lower cost. Write The Lincoln Electric Co., Cleveland 1, Ohio.

*Ingineering . . . the science of originating new engineering designs.



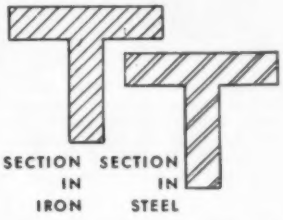
Steel is 3 Times Stronger. *Has 4 times the resistance to fatigue.*

Steel is Ductile. *Withstands impact, and shock without fracturing.*



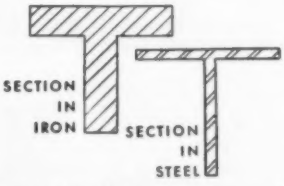
Steel is Twice as Stiff. *Only half the material is needed in welded steel designs to achieve equal rigidity.*

the ACTUAL



Saves 50% Material Cost *by duplicating cross section in steel.*

increasing the YIELD



Needs 60% Less Metal *to achieve equal strength in bending.*

the IMMENSITY of the POSSIBLE

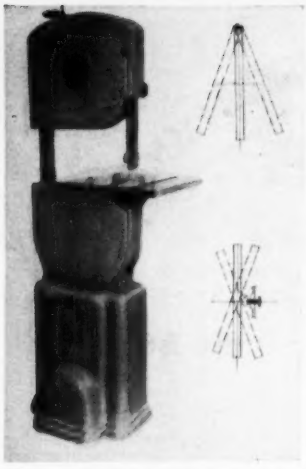
An initial 7 to 1 cost advantage with welded steel

SEE HOW WELDED STEEL CUTS COSTS

Machine Design Sheets are available to designers and engineers. Simply write on your letterhead to Dept. 104

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 1, OHIO



Bandsaw made by Tyler with top drawing showing how upper bandwheel adjustment is made. Lower drawing shows how, it is claimed, the adjustment is made on other bandsaws, that is, with pivot point near axis

Infinite Blade-Speed Range In Tyler Bandsaws

A blade-speed range of from 80 to 5000 fpm is offered by these bandsaws. Adjustment is by handcrank, with a speed indicator located at eye level.

Blade tracking is through a large yoke which places the pivot point at the crown of the upper bandwheel. With this arrangement the upper wheel can be adjusted without throwing the crown out of alignment with the bottom wheel. It is claimed that in other bandsaws the upper-wheel pivot point is located near the axis and in back of the wheel, tending to throw the top side of the wheel in or out.

The guides for flat blades are of hard cast bronze, with the guide blocks adjustable fore and aft as well as sideways.

The upper bandwheel assembly is mounted on a rigid steel tube and is adjustable 4-in. vertically to provide 8-in. blade takeup. The cast-iron, ground table is 16½ x 17 in. and tilts 45° right and 5° left. The machine is supplied with guides for the company's Spyral blades.

Tyler Mfg. Co., Inc., 1005 W. Arbor Vitae, Inglewood, Calif.

Metal-Chemical Alloy for Bearings, Casting, Free Machining

Chemalloy is an alloy of metals and chemicals composed of zinc pot metal manganese bronze, solder, muriatic acid, sulphur, and a reverberatory slag acting as a chemical carrier. The alloying chemicals are the acid, sulphur and a special charcoal.

It is produced by bringing together an alloy of molten metal plus an alloying of a wet chemical mass without the usual explosion hazard.

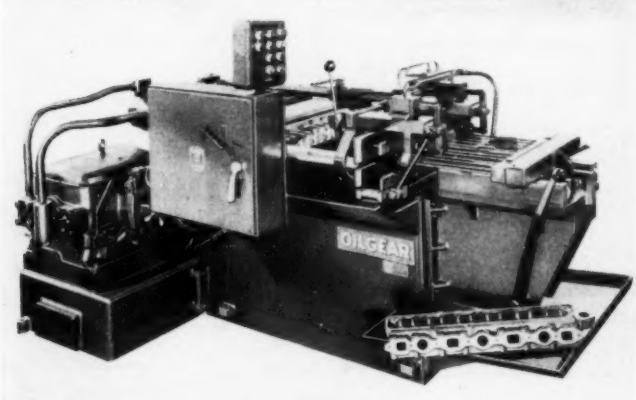
The metal is claimed to show great promise in any of the following applications:

1. Dry bearings, ie., without lubricant. Dirt, grit, abrasives, and steel chips are said not to seize. Instead, they cut fine grooves and slowly wear away. May be used with water or oil lubricant.
2. Free-machining metal requiring no coolant and entailing little wear of the cutting tool.
3. Precision-casting metal that is claimed to hold a close tolerance.
4. Welding rod for aluminum and possibly other metals without the use of a flux. May be applied to aluminum heated short of its melting point.
5. Heat dissipation to remove heat from metals in frictional contact with it.

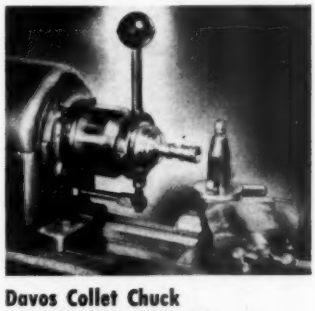
Rapid semi-quantitative analysis shows about 90% zinc, 0.7% tin, some copper and nickel. It is insoluble from the zinc.

The introductory price for small quantities is $1.25 per lb in bulk FOB Louisville, Ky.

Transport Products Corp., 120 S. Campbell St., Louisville, Ky.



HORIZONTAL BROACH machines twelve valve-guide bushings that have previously been pressed into a 6-cyl truck-engine head. Features include a selector switch for semi-cycle or manual control, fully interlocked cycle to protect tools and work, variable broaching and return speeds, and hydraulic clamping and group handling of tools. Peak capacity is 48,000-lb pull. The adjustable stroke ranges from 6 to 15 in. Broaching speed is up to 30 fpm.—*The Oilgear Co., 1563A W. Pierce St., Milwaukee 4, Wis.*



Davos Collet Chuck Cuts Work-Handling Time

Draw-collet chuck may be used on a drillpress, lathe, milling machine or grinder. A lever with a knob handle acting on a clutch bushing opens and closes the collet. Work on a lathe can be loaded and unloaded without stopping the spindle. The collet continues to grip when in open position because of a permanent stop.

The chuck is adaptable to all round, square, hex, and plain, serrated or special collets. Five models are available with capacities ranging from 1/64 to 1¾ in.

A straight mounting accessory holds the lever on lathes where head mounting is not advisable. It is made of cast steel with adjustable center posts for various heights.

Stallion Mfg. Co., 2017 N. Halsted St., Chicago 14, Ill.

STANDARDIZE WITH THE NEW BETTER THAN "STANDARD"

SINTERED FIRTHITE CARBIDE

HA **TA** **T-04**

BETTER DELIVERIES

These *new, improved Firthite standard* grades are superior in many respects to the more costly "special" grades formerly required. Better performance goes hand-in-hand with carbide tool standardization.

INCREASE PRODUCTION

By specifying these *new, improved* grades of Firthite you get *faster service* because we can concentrate our production and furnish larger quantities to industry.

REDUCE INVENTORY

With Firthite's *improved standard* grades, there will be less need for large stocks of "special" grades. Excessive investments in "special" tool or tip stocks can be eliminated.

The tremendous demand for carbide tips and tools, plus controlled supplies of critical alloys, requires grade standardization wherever possible to maintain your production schedules at peak efficiency.

Nearly three years of research* and shop testing have proved the superiority of the new, improved *Firthite* standard grades HA, TA and T-04 over the other standard and special grades of sintered carbide. We know they are outstanding . . . let us prove it to you.

**Research is important and continuous at Firth Sterling on all carbides and tool steels.*

ASK FOR A FIRTHITE SERVICE ENGINEER TO HELP YOU STANDARDIZE WITH THE NEW IMPROVED HA, TA, T-04 GRADES.

Firth Sterling STEEL & CARBIDE CORPORATION
McKEESPORT, PA.

DISTRICT OFFICES AND WAREHOUSES

HARTFORD NEW YORK PHILADELPHIA DETROIT CLEVELAND
DAYTON PITTSBURGH CHICAGO BIRMINGHAM LOS ANGELES

He's "tickled PINK"

No wonder! With Simonds Abrasive Company wheels on the job everything is rosy in the grinding department. Rejects are rare . . . down-time is out . . . and production's keeping pace with defense needs. It's all a matter of selecting wheels accurately specified for your jobs . . . the kind of selection available to you in Simonds complete line including grinding wheels, mounted wheels and points, segments and abrasive grain. Free data book describes these efficient production tools . . . products of Simonds Abrasive Company, a major manufacturer of grinding wheels for over 50 years. Write.

SIMONDS ABRASIVE CO.

grinding wheels

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

ROUND TABLE Discussion

LOST DIAMOND MYSTERY

Ever since the day I pulled a "Mitchner", more than a quarter of a century ago, the lost diamond has come up in my mind quite often. At the time of my "accident" I was doing my darndest to get a job out and, failing to locate the star-wheel dresser, I, in a fit of desperation—and evidently in a foolish frame of mind—grabbed for the first thing within reach: the diamond dresser off the surface grinder. I didn't even take the time to remove the base block and proceeded to clean up th 8-in. wheel on the tool grinder.

The shock was too much for the setting. The precious stone bounded over the dirty floor to oblivion! After wrecking the knees of a good pair of trousers, I gave up in utter disgust and awaited the wrath of the foreman. I felt obliged to pay for the loss of the diamond, but being short of cash at the time I hesitated in sticking my neck out. I let the boss smoulder with the satisfaction that the world was chuck-full of jackasses and damn fools. The passing of time healed the wounds of conscience and there the matter died a slow death.

What is the best way to handle damages caused by an employe's thoughtlessness? Was the worker under excessive stress to get the job finished on time? Was he habitually careless? Or was he the type who just didn't give a damn what happened?

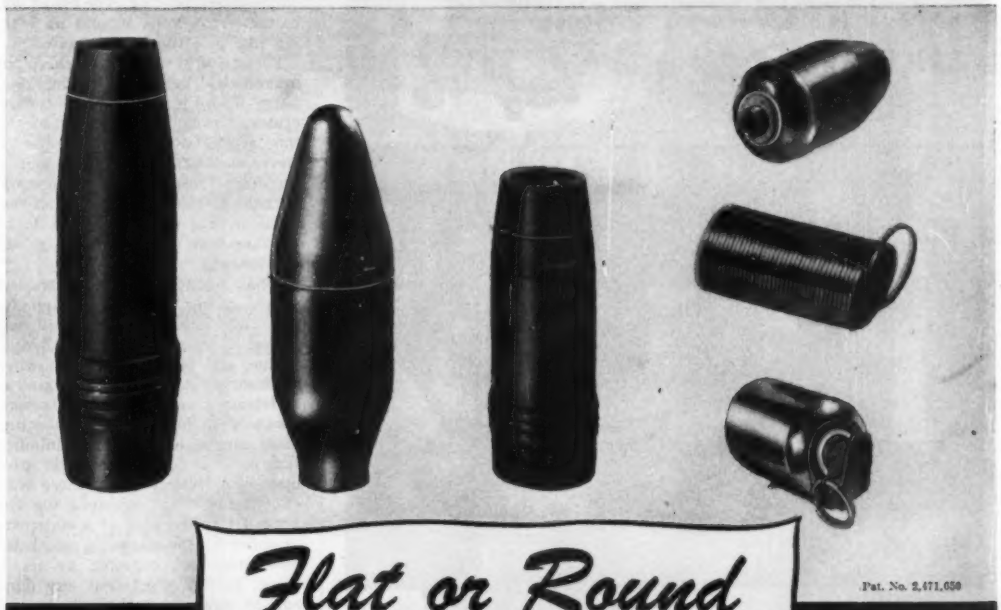
In the first instance I should think that the man ought to be given the benefit of the doubt and the matter dropped, except, of course, he should be given a good going over by the foreman to impress him with the consequences of thoughtless action. If the man were habitually careless it seems that the responsibility rests on the foreman, who should have corrected the man of his bad habits or else tied a can to his trouble-making tail. This type should not have been hired in the first place; the personnel department should have sent him on his way.

Fortunately we have a paucity of the type who are maliciously inclined —those don't-give-a-damners. What needs to be emphasized is the fact the worker should not let eagerness interfere with judgment—he should think before he acts.

I certainly did not, and even to-

DEFENSE ORDER

SILVER BRAZING NO PROBLEM WITH
Ever-Exact...Cost Cutting



Flat or Round

Pat. No. 2,471,650

"No Tangle" Notch Coil Rings

Made from SILFOS and EASY-FLO

NOW AVAILABLE IN FLAT WIRE, TOO, IN ANY THICKNESS AND DIAMETER FOR ANY SILVER BRAZING REQUIREMENT ! ! !

NEW FLAT WIRE RINGS boost production, cut costs, save time and materials . . . provide complete fill, add strength to critical joints where shape and depth of groove require more alloy . . . stress-relieved to keep ± .001-inch tolerance at all times . . . "job-design" assures that only needed amount of alloy is used . . . notch-coil eliminates tangling, cuts handling and damage, speeds assembly, aids storage and inventory . . . can be used in inner and on keyed and non-keyed outer diameters.

Prompt delivery-Approval samples submitted with all quotations

LUCAS-MILHAUPT ENGINEERING COMPANY
5057 S. Lake Drive · Cudahy, Wisconsin

Save...

MONEY . . . cut silver brazing costs by 25 to 63 percent of hand-fed wire or ordinary machine-wound ring methods. Eliminate rejects, machining of brazed parts, distortion, breakage, waste or loss.

TIME . . . notch-coil permits rings to be detached individually . . . cut handling time by 25 percent. Just snap ring off coil and snap in or on assembly. Coil assures safe handling, storage, inventory.

MATERIALS . . . rings are designed to fit the job. No waste through spillage. You can save up to 45 percent in material cost alone! Just enough alloy is used to completely fill your brazing needs.

IF YOU WANT TO
ELIMINATE GASKETS
ON PARTS
LIKE THIS...

...INVESTIGATE
LAPPING ON A
LAPMASTER

Expensive gaskets for this 9½" long, intricate cast aluminum body have been eliminated with a 48" Lapmaster by lapping the joint surface flat to an all-over light band pattern. Pressures up to 3500 psi can be sealed when mating faces (of sturdy pump parts) are lapped to this tolerance.

The Lapmaster 48" readily handles large and small parts of a wide variety of shapes and materials in production runs. *This machine does not require conditioning of the lap plate, it uniformly distributes "wet" lapping compound, and it operates with practically no maintenance.*

96 Parts Lapped Per Hour

Production on the valve body part shown above is maintained at the rate of 8 parts per five minute cycle. The machine is equipped with 4 lap-conditioning rings each holding two parts.

Get the Facts on Better Lapping Production and Accuracy—

Investigate the production and accuracy possibilities of Lapmasters. This 16 page book contains valuable information on this remarkable new lapping method. Write on your company letterhead today. Dept. AM 4, 1836 Cuyler Ave., Chicago 13, Illinois.

JOHN CRANE
CRANE PACKING COMPANY
LAPMASTER DIVISION CHICAGO 13, ILL.
Offices in All Principal Cities in United States and Canada

day I blush at the unmitigated gall I displayed in accepting my check. There is a similar situation that comes to mind: A worker anxious to get his job out of the lathe was so eager to put the mike on the final cut that he did so before the piece had stopped rotating. The result was pathetic; the mike wound up looking like a left-hand fish hook.

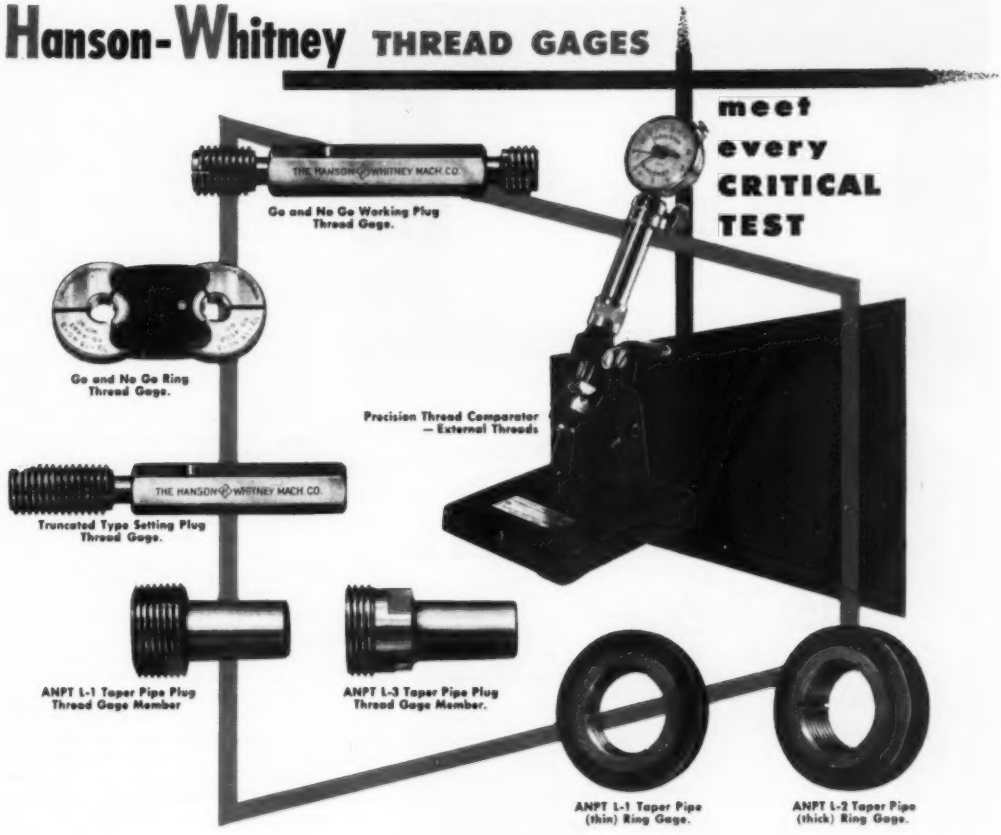
Fortunately for the worker, the micrometer belonged to the company. There is a case where the operator, through his efforts to get the work done, slipped, as it were, and wrecked a good tool. I shouldn't think that the man could be held to make good the loss, because in this case it appears to be an accident notwithstanding the carelessness.

What about a merit system in which demerits can be given for conditions such as those outlined above. Give a man credit where it is due, and take it from him when he deserves it. Impose some kind of a deterrent so that thoughtlessness resulting in loss of valuable equipment can be kept to the minimum. It is possible for bad habits to grow upon some people unless there is an effective restraint put upon the violator. I like the idea of a statement of policy by the company, which the new employe confronts as he is hired, to the effect that any damage to equipment through an employe's wanton carelessness will result in his dismissal if he fails to remunerate the company for the loss incurred.

John Homewood
Ontario, Calif.

"Well, don't just stand here, young man—try to geta word in edgewise."

Hanson-Whitney THREAD GAGES


meet every CRITICAL TEST
THE HANSON-WHITNEY MACH. CO.
Go and No Go Working Plug Thread Gage.
Go and No Go Ring Thread Gage.
Precision Thread Comparator — External Threads
THE HANSON-WHITNEY MACH. CO.
Truncated Type Setting Plug Thread Gage.
ANPT L-1 Taper Pipe Plug Thread Gage Member
ANPT L-3 Taper Pipe Plug Thread Gage Member.
ANPT L-1 Taper Pipe (thin) Ring Gage.
ANPT L-2 Taper Pipe (thick) Ring Gage.

The defense program, now spiraling, is going to wear out thousands of gages — especially those of sub-standard quality.

To insure continual close tolerance production, and longer gage life, specify Hanson-Whitney Gages—manufactured of the best materials to exacting Federal Government Standards, subjected before shipment to a battery of rigid Hanson-Whitney tests.

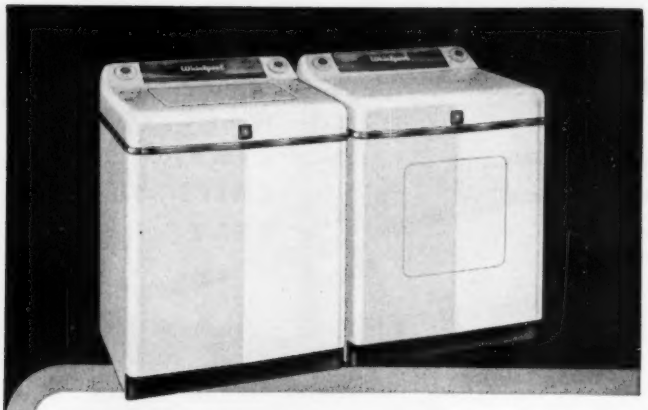
The H-W gage group illustrated provides you with a complete inspection gaging set-up for practically any thread regardless of form, pitch, or major diameter.

If your prints call for special design thread gages and gaging techniques, feel free to call upon our Engineering Staff for counsel . . . for this service has always been an integral part of our "Production Insurance" program.

HANSON-WHITNEY COMPANY • HARTFORD 2, CONN. • DIVISION OF THE WHITNEY CHAIN COMPANY

Hanson Whitney

PIONEERS OF FINISHED TAPS



Whirlpool

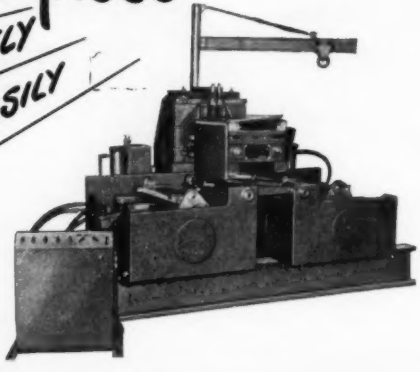
makes beautiful cabinets in

one piece

QUICKLY

EASILY

at lower cost with the



Struthers Wells TANGENT BENDER

The standout "eye-appeal" of WHIRLPOOL Washers and Dryers is a result of expert styling. The *fabricating economy* underlying smart appearance is a product of the Struthers Wells Tangent Bender!

Using the Quadruplex model illustrated, four bends of a pre-form blank are made in a single operation of the machine —producing in moments a complete wrap-around cabinet base with radial edge bent flange.

May we outline the savings *you* can expect? Write!

STRUTHERS WELLS *Corporation*

***Machinery Division*: TITUSVILLE, PENNA.**

SHOP FBI

THE IDEA of a shop spying system has always hit a sour note in the theme of good supervisory practice. It just seems out of line with the American way of doing things. In many countries with which we are more or less familiar, informers are as common as house flies, and about as popular. In any form of shop espionage, some person or persons will have to play the masculine counterpart of Mata Hari, and thereby incur the undying enmity of his or their fellow workers. It is not fair to ask any worker to place himself in this unenviable position.

Furthermore, in this day and age, it is more than probable that the principal of this practice will wake up with a strike on his hands. Americans don't favor this form of undercover activity.

There should be a better way. The first thing that comes to mind is the safeguard of putting a padlock on the electrical disconnect switch. It is granted that some parts of the machine may still be moved by hand, but there is little likelihood of this doing any serious damage to the machine.

It is the responsibilty of the supervisor to schedule his work and personnel in such a manner that will most likely insure optimum use of time and equipment. The fact that only one of Al's men was properly qualified to operate the machine leaves him without a leg to stand on when it comes to explaining the mechanical failure. He has neglected one of the more important aspects of supervision, in that he failed to provide for the training of adequate personnel.

It appears that the best solution of Al's problem is for him to provide, within reasonable limits, adequate skilled labor at all times. Besides this, steps should be taken to make his more valuable equipment inoperative to all except those persons particularly qualified to use them.

C. F. Dandareau
Centerline, Mich.

•

WHEN the pinion on a lathe apron stripped, Ed received the following stock answers:

"'Taint me that did it."

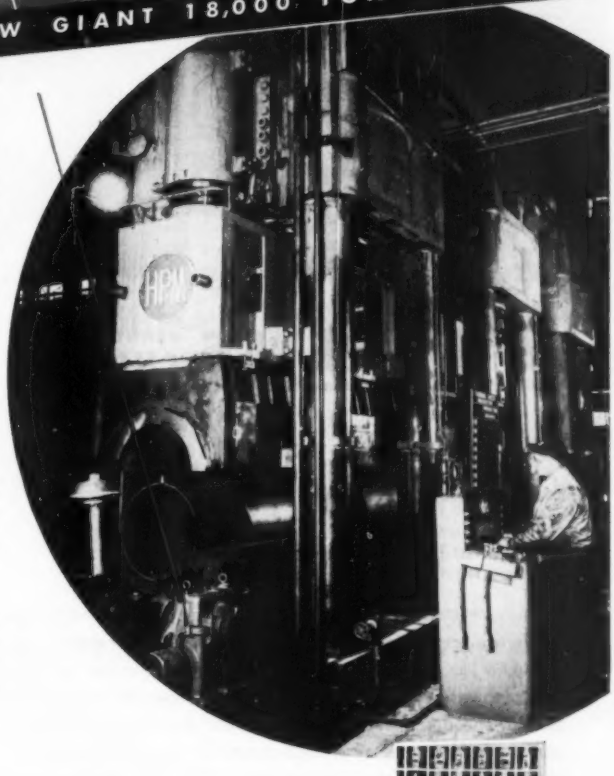
"I don't know, I found it that way."

"Don't blame me, see Jones."

These answers are a goat getter. What is the employee afraid of. He may fear criticism from the boss, or he may fear someone else in the organization. He may have some false

DIAMETER STEEL PIPE *IN A HURRY...*

WITH H-P-M'S NEW GIANT 18,000 TON PRESS!



This giant H-P-M 18,000-ton press takes a 40½ foot long plate of ½ inch steel and forms it into a 36 inch diameter pipe at a production line rate. That's the role selected for two of these huge H-P-M presses now in production at National Tube, McKeesport, Pennsylvania, and Consolidated Western Steel, Orange, Texas.

The hundreds of H-P-M presses now serving the metal working industry have been selected because of their exclusive operational features: FASTRAVERSE hydraulic power system—quick, easy adjustment and control of press speeds, strokes and pressures—features that mean long die life and production with virtually no rejects.

Regardless of the size of your forming, drawing or stamping operations, there's an H-P-M press to improve your production. Call an H-P-M engineer for complete details.

HPM

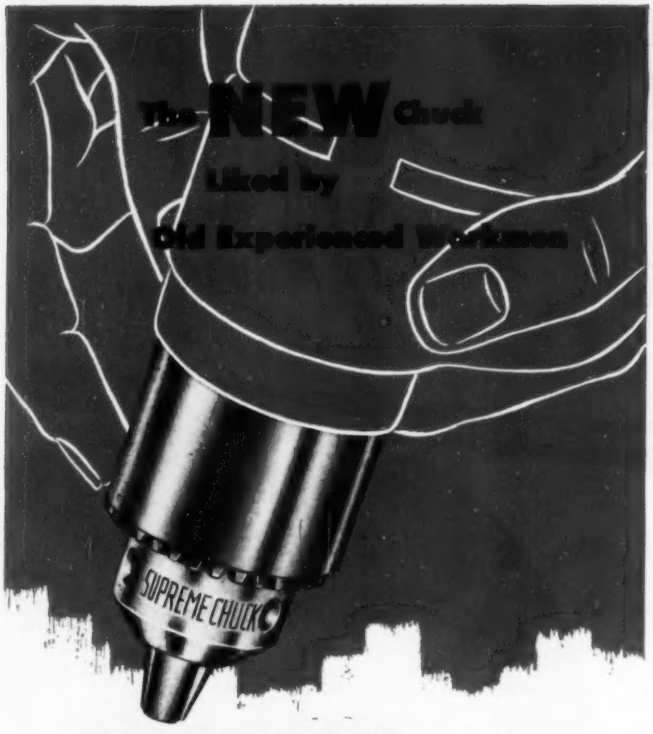
THE HYDRAULIC PRESS MFG. CO.

1002 MARION ROAD - MOUNT GILEAD, OHIO, U.S.A.

Makers of Presses for the Metal Working and Processing Industries - Plastics Molding Presses - Die Casting Machines Hydraulic Pumps, Valves and Power Units.

Write for your free copy of Bulletin 5005 which completely describes H-P-M FASTRAVERSE and other special purpose H-P-M presses.

SERVING INDUSTRY THROUGH HYDRAULICS



SUPREME BRAND **CHUCKS**

Judged by performance... they have Quality that can be depended upon

This new chuck has been in the field for some time . . . not on test but in use under actual working conditions. Old experienced workmen like it, as it gives dependable trouble-free service. When you check its precision construction, you understand why this new product meets all the old tests. Every care is used in manufacturing . . . every chuck is inspected and checked for accuracy before it is sent into the field. When you see the name SUPREME on a chuck, you can rest assured that you can depend upon it . . . It represents real "Quality."

SUPREME BRAND **CHUCKS**

Supreme Products, Inc., 2222 So. Calumet, Chicago, Illinois

THE CHUCK THAT LIVES UP TO ITS NAME...SUPREME

honor within himself that stops him from telling the truth.

In this case it looks like Ed has let his emotions get away from him and lost control. When we lose control of ourselves we cannot control the other fellow. When an employee makes a mistake and tells the boss about it the boss cannot help but respect this good quality. The good leader keeps calm, thinks and plans. He tells the employee what he did wrong, how to prevent a reoccurrence, and anything else which seems helpful to prevent damage.

Our ability to get the right answers depends on our skill in tact, and resourcefulness in dealing with people. The employee has nothing to fear from this kind of a boss. Al's suggestion for a faked up job is a foolish one. We must have the ability to make clear to the employee that bosses are not monsters. We must let them know we are not trying to get the last ounce of work out of them for the least amount of pay. We still have a job of training in convincing the employee that buck passing has sharply undesirable results.

A. E. Salmons
Philadelphia

•

FROM THE information given in this case it looks to me that the most likely thing to have happened was someone carelessly starting the lathe when the carriage was prevented from moving by being blocked in some way. When power was applied by some meddler, the drive pinion could not revolve and nothing was left for it to do except split as it did.

I came to this conclusion by experiences with young apprentices in the shop where I was general foreman. Their curiosity seemingly could not be satisfied until someone had turned a knob or moved a lever just to see what effect it would have, even though they had been cautioned not to handle any tool until they had been informed of its purpose.

There doesn't seem to be much chance of finding out just how this break did occur, however there may be a chance of the truth leaking out at some future time when matters are quieted down and the party involved is not likely to suffer for the act.

I don't believe a setup of FBI would be a success but would recommend doing everything possible to give the workmen confidence.

Fair dealing between employers and employees gives better results than police protection.

H. B. Martin
Watervliet, N. Y.

HELLER

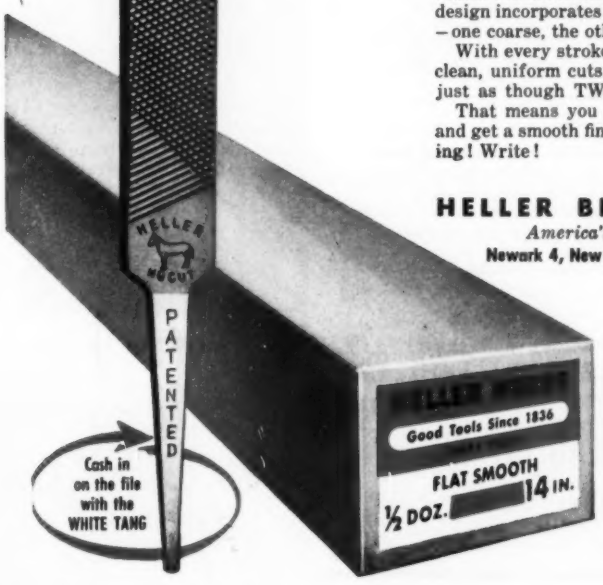
NUCUT WAVY TEETH FILE

GOOD TOOLS SINCE 1836

. . . it's different

. . . it's patented

. . . it's the only file that gives double-duty filing action



It's the patented Heller Nucut "Wavy Teeth" feature that makes the difference. This cut-and-smooth two-in-one filing design incorporates two sets of *scientifically* positioned teeth – one coarse, the other fine.

With every stroke of a Nucut, the coarse teeth take deep, clean, uniform cuts. The fine teeth leave a smooth finish – just as though TWO files were working instead of ONE.

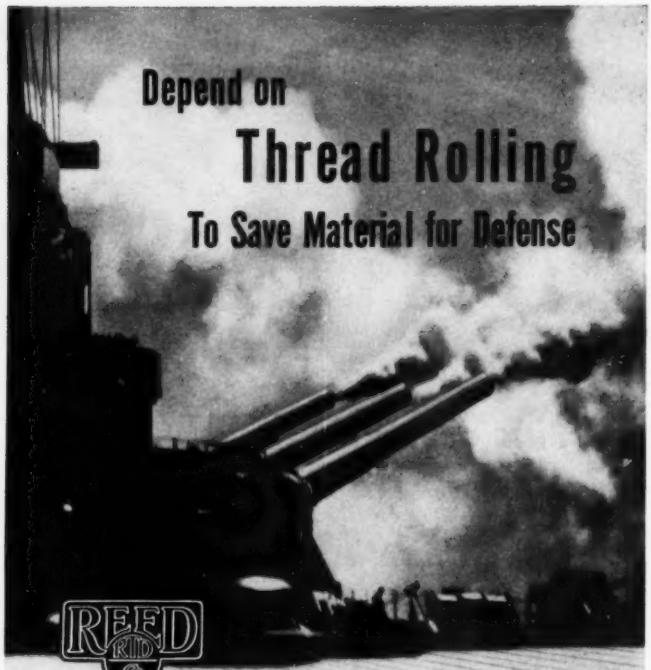
That means you can remove more metal faster, easier, and get a smooth finish without clogging, skidding or scraping! Write!

HELLER BROTHERS COMPANY

America's Oldest File Manufacturer

Newark 4, New Jersey — Newcomerstown, Ohio

Ask also about our COMPLETE LINE of Swiss Pattern, Vixen Milled Curved-Tooth and Rotary Files, Rasps, Carpenters', Machinists', Tinners', Upholsterers', Bricklayers', Tilesetters', Blacksmiths' and Farriers' Hammers. Also Bricklayers' and Plasterers' Trowels, Craftsmaster Scrapers, Chisels, Punches, Masterenches and other quality tools.



REED ROLLED THREAD DIE CO.

Cylindrical Die Thread Rollers

For Precision Threading Knurling — Forming Burnishing — Serrating

Thread rolling saves expensive material at a time when it is not only at a premium but difficult to obtain. This is particularly true on headed parts, metal stampings and long or short bars partly threaded or threaded their entire length.

As a pioneer in thread rolling, Reed has worked closely with the Air Corps, Army and Navy in engineering the various applications of thread and form rolling. Reed equipment has provided an economical method of producing precision parts at lower manufacturing, assembly and inspection costs.

Send us specifications of your requirements and let us supply you with complete information.

REED ROLLED THREAD DIE CO.

Manufacturers of

THREAD ROLLING MACHINES and DIES • KNURLS • THREAD ROLLS

Worcester 2, Massachusetts, U. S. A.

AM-021

SHOP FBI *(continued)*

BREAKAGE of machines and the failure of operators to report broken parts is as old as time itself. Somehow human beings always hide their errors and try to get out of admitting the doing of wrong.

Will one man to a machine solve the problem? Yes and no. If your company can afford to employ only one worker for each piece of equipment and is able to buy enough equipment so the company is not forced to run extra shifts, perhaps the broken machine problem could be solved. Yet, under these conditions a man will still try to get away with not admitting his fault. He will try to blame the sweeper or some other worker.

One man to a machine is not a reasonable solution. Machines must be operated by more than one operator. This will be increasingly true in the days ahead when we try to produce both for defense and civilian usage. How then should we progress to try to stop this equipment breakage?

Let us face the facts. We cannot entirely stop the breakage. Accidents will occur. Too frequently recurring ones can be controlled by proper investigation. Machines used by industry today will wear out. As the machines wear, many parts not seemingly affected by the wear will break.

Use preventive maintenance to control this. Don't expect your workers to feel that they are responsible for broken gears when the bearings are badly worn or the backlash is excessive.

Have your foremen put their houses in order before looking for trouble. Good workers who have pride in their equipment and in their work can become easily dissatisfied and quit if you try to spy or accuse them of breaking up equipment.

Here's the quickest way!

...ON A

LAPOINTE

Single Ram Vertical Broaching Machine

WITH LAPOINTE TOOLS AND FIXTURES

Turbo-supercharger wheel and mating blades for
JET LOCOMOTIVE ENGINES
Both broached from the solid

This 15 ton, 90" stroke SRV LAPOINTE BROACHING MACHINE handles both jobs through interchangeable fixtures.

It broaches 32 pine tree slots in the wheel (a conventional forging) in 65 minutes, and 60 mating blade forms (from bar stock) in an hour! The fixture for the wheel has hydraulic clamping and is provided with completely automatic indexing. The fixture for the blades permits broaching two mating forms at the same stroke of the machine — one rough broached and one finished.

Another instance of LAPOINTE taking the responsibility for the COMPLETE Job: MACHINES, TOOLS, and FIXTURES!

Send for Bulletin SRV-2

THE *Lapointe* MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS, U. S. A.

Branch Factory: Watford, Herts., England

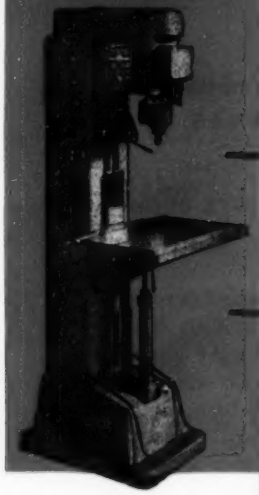
THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR!
3800 PER HOUR!
2500 PER HOUR!

For Top Production



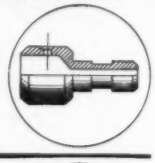
SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

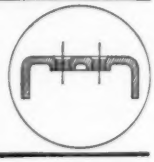
DRILLING

Crossdrill and C'T' Sink 1/16" Hole
Material—Brass
Production—4800 per hour
Fixture—#15 Vertical index
Equipment—#1-UD Drilling Machine



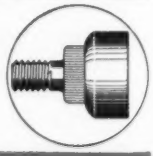
TAPPING

Tap Two #10-32 Holes
Material—Steel stamping
Production—3800 tapped holes per hour
Fixture—#14 horizontal index
Equipment—#1-UT tapping machine



THREADING

3/8"—24 Thread—1/2" Long
Material—Die Cast Aluminum
Production—2500 per hour
Fixture—#10 Drum dial
Equipment—#3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production.

Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

SNOW
MANUFACTURING COMPANY
435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Drill Press Tap Heads • Automatic & Semi-Automatic Jigs & Fixtures

Submit Sample Parts for Production & Cost Estimates

If Ed as a foreman had the confidence of his men, he would pretty well know where the blame lay. No doubt some of it is his own fault. A good foreman does not have to accuse his workers. He does not have to call them down and read the riot act. He is able to tell what is going on, at least on his own shift.

Multiple shifts always cause trouble. Friction between management is usually the main trouble. If top management would spend more time with its foremen and stress the foreman's relationship to other management members of the company, less internal friction would exist and with it would come better accounting for broken equipment.

We must face the fact there is no real way to control machine breakage and have the person responsible admit it. We can tend to keep the equipment in a condition where when breakage does occur we are pretty sure it is due to human judgment errors. We can determine a pattern of each worker's habits. Those workers with sloppy habits will tend to contribute toward machine breakage.

When excessive breakage occurs the foreman can, if he knows his job, and if he has the proper machine maintenance to support him, point out the man whose error in judgment caused the machine failure. These employees can be segregated and when conditions warrant they can be dispensed with . . . perhaps to some job not requiring machines or let go all together if necessary.

Always be sure that your foremen see that all their workers know how to operate the machines they are required to use in the course of a day's work. Don't take it for granted that a man knows how to operate a machine. Be sure that he does and knows how to operate it properly. Show him how . . . take the time to do it . . . it pays off.

Charles D. Townsend
West Hartford, Conn.

•

THE THING which troubles Ed also troubles the man who is responsible for the stripped lathe pinion. Ed wants to maintain his reputation as a good supervisor, and he feels maintenance of that reputation is not consistent with an unreasonable amount of broken equipment. The man who stripped the pinion, by whatever means, also feels he has a reputation to maintain, which ties in with his security, and consequently plays ignorant.

Any attempt at a solution of the

Gear Tooth Crowning

(ELLIPTOID TOOTH FORM)

A CONTROLLED PRECISION MACHINING OPERATION

Gear tooth crowning (Elliptoid Tooth Form) is used for just one purpose—to prevent "end bearing," which is a concentration of operating load at the end of the tooth where it is most vulnerable to failure.

Crowning is the only way to prevent end bearing because with any gear assembly it is impossible to maintain accurate gear alignment under all conditions of loading. Shafts, bearings and mountings are all elastic. Even the slightest deflection will cause misalignment and end bearing in gears with conventional teeth.

Many of the leading automotive gear plants have standardized on crowning to raise the factor of safety of gear teeth and to reduce operating gear noise. Crowning does both successfully.

Crowning accomplished on Red Ring Gear Shaving Machines is a precision machining operation by which the maximum amount of crown is always under positive control. Tolerance control is indicated by a typical routine check of a lot of 4000 gears having the following specifications: 1″ face, 18 teeth, 13.5 Nor D.P., 20° Nor P.A., 27° H.A. and .0003″ to .0005″ crown. An adequate check failed to reveal any unit outside the .0002″ tolerance on crowning.

WRITE FOR BULLETIN S49-5 FOR A MORE DETAILED DISCUSSION OF GEAR TOOTH CROWNING

5621

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

NEW...fully-illustrated BULLETIN on

TOOL CRIB CONTROL

FREE ON REQUEST

. . . presents step-by-step procedure used profitably in hundreds of plants . . . . . how it works to—

. . . Record each employee's tools or gages, preventing theft and loss;
. . . Recover idle tools;
. . . Cut crib inventories;
. . . Reduce tool breakage;
. . . Locate each tool, loaned or in crib;
. . . Eliminate delays, saving man and machine time;
. . . Stop arguments and otherwise speed service;
. . . With no increase in crib personnel—

Fully described in this bulletin

Complete control of your tools and gages will save dollars and head-aches in the months ahead. Mail coupon for your copy today.

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Send me the facts on McCaskey Tool Crib Control.

Name .....
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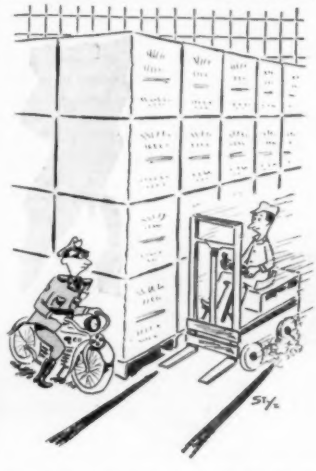
AM 4-51

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

problem must be made with this fundamental desire of the average man in view. Whatever can consistently be done, (without antagonizing the men and losing their good will) to make such things more difficult to hide, is a step in the right direction, and will foster greater care on the part of the normally irresponsible. But the idea of using an amateur sleuth or group of sleuths is not workable. If the sleuth were known to the men in general, they would ostracize him and make life unbearable for him. On the other hand, it would be difficult for any man to function in this manner without soon being caught. Then it would be worse for him than if he had done his sleuthing openly.

A man is morally liable for a stripped pinion or other untoward accident only to the extent that he is deliberately careless. Any industrial department must expect a certain number of such happenings, even though it be supposed that all men in the department are reasonably careful. Much depends on the frequency with which such things occur. If there is an unreasonable frequency of occurrence, it is well to seek for corrective measures, but let no man suppose that he will ever head up a department which is perfect in this respect.

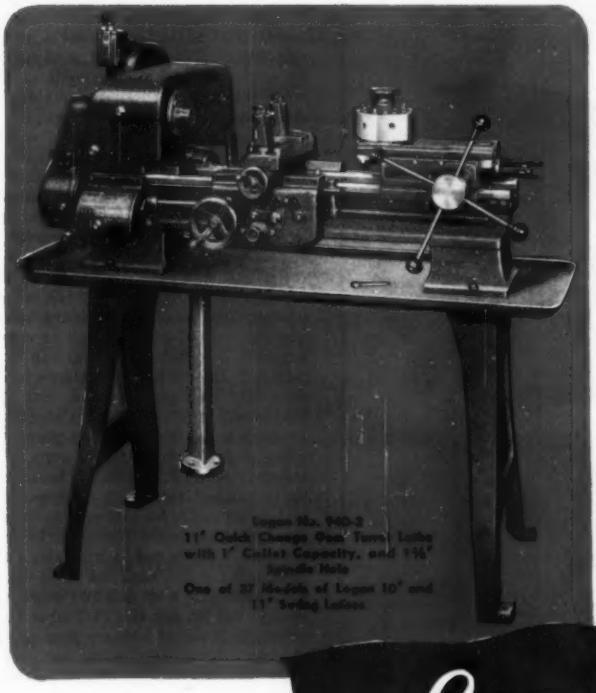
Advantages inherent in the idea of one man and only one man operating a given machine are very real in some production layouts, but are so limited as to be practically nonexistent in others. This is a good rule to apply so far as it may consistently be applied in any given plant or department. Where there is enough work for a given machine to keep it busy constantly with a given skilled operator, the rule certainly applies,



USE LOGAN LATHES

FOR PROVED PRODUCTION PERFORMANCE

Production results over the years have demonstrated the efficiency, durability and economy of Logan Lathes. These results are the reasons why industry is using more Logan Lathes today than ever before.


Logan No. 940-S
11" Quick Change Gear Turret Lathe
with 1" Collet Capacity, and 1⅛"
Spindle Hole
One of 37 Models of Logan 10" and
11" Swing Lathes

THESE LOGAN CHARACTERISTICS WILL HELP YOUR PRODUCTION

CAPACITY . . .
With 1" collet capacity, 11" swing, 1⅛" spindle hole and center distances of 24" and 36", Logan Lathes have the size to handle substantial work.

ACCURACY . . .
Less than .0005" spindle runout 12" from the bearing . . . two V-ways and two flat ways precision ground to within .0005" variation . . . these are typical Logan Lathe construction tolerances.

VERSATILITY . . .
The Logan Lathe gives you spindle speeds of 45 to 1500 rpm with no bearing adjustment. A complete line of accessories further equips these versatile tools for every type of lathe operation.

RUGGEDNESS . . .
With its ball bearing mounted spindle, its self-lubricating bronze bearings at vital wear points, and its rugged overall construction, the Logan Lathe retains its accuracy and dependability under constant use.

ECONOMY . . .
By reducing power costs; by saving vital floor space; by quick, easy set-ups; by lasting accuracy and low maintenance; Logan Lathes put many metal turning operations on an economical and profitable basis. The saving to be realized on your original investment in Logan Lathes is a further economy well worth considering.

LOOK TO Logan FOR BETTER LATHES AND SHAPERS

FOR FULL INFORMATION, VISIT YOUR LOGAN DEALER, OR WRITE

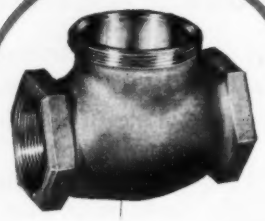
LOGAN ENGINEERING CO.

4901 WEST LAWRENCE AVENUE • CHICAGO 30, ILLINOIS

ONLY

GOSS and DeLEEUW AUTOMATIC CHUCKERS

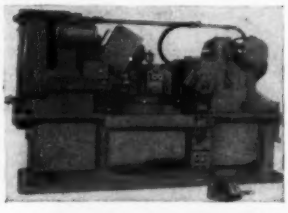
offer the **1-2-3** *feature*



This NEW development—unsurpassed for speed, convenience of tooling and precise finish—involves no retooling problem even for short runs. It assures greater production at lower cost on all classes of work.

The unique "1-2-3" feature, exclusive with Goss & De Leeuw, provides the means for performing one to three right or left hand single or double threading operations simultaneously or in sequence, without changing set up.

Here's an ideal machine tool for small lot requirements because of quick, easy changeover. Any class of chuck work can be handled economically in any quantity.



The examples of work shown here are typical of the wider variety of parts being produced on these new machines.

SEND FOR detailed information on this new machine. Let us have samples of your work in order to give you time and cost estimates for handling it on the "1-2-3" Goss & De Leeuw.

GOSS and DE LEEUW
MACHINE COMPANY, KENSINGTON, CONN., U.S.A.

but it can apply no further. There will always be the necessity for more than one man to work on many of the machines in the average machine shop.

One idea relative to fixing the blame for broken equipment can be used in plants where skilled setup men are employed, by making it mandatory for each machine operator to signal the fact as soon as he has finished a run, and by imposing on the set-up man the responsibility of clearing the machine and tearing down the setup at the first opportunity after the signal. A colored lamp may be used over or adjacent to each machine, and the operator can be required to turn it on as soon as he has finished a run, the setup man turning it off again as soon as he has torn down the machine setup and made at least a cursory inspection of its condition in the meantime. But even with such a provision, the tail will be found wagging the dog in many cases. That is, general trouble and cost involved in maintenance of such an extraordinary requirement may more than outbalance an occasional stripped pinion in some shops.

Not only multiple shifts, with their passing of the buck from one shift to another, enter into the difficulty of maintaining a close checkup on matters of this kind. Idle machine periods, if many, or if protracted, also greatly aggravate the difficulty. Usually, the stock question involves discovery of the man who operated the broken equipment last, and the type of job in which he was engaged. If these two things can be certainly established, the blame can generally be rightly placed. But if Ed himself is not on his toes enough to have a fair line on such things, when it is definitely to his own interest to watch it, it is either because he is himself negligent, or because he has too much for one man to take care of. If he deems the latter to be the case, let him put in a bid for an assistant. Let the assistant aid Ed in what sleuthing may patently be necessary, but let not the FBI label be attached. It would be very poor psychology. Somebody with an evil sense of humor would almost surely make a successful attempt to outsleuth the sleuth, and there would be all sorts of undercover fun at his expense.

John E. Hyler
Peoria, Ill.

THEIRS NOT TO REASON WHY

When the foreman's attention had been called to defects in the design of the progressive die and its support bracket, as in this case, he should

• ROTOR SCREW DRIVERS
• MAGNETIC BITS

"PAID OFF" IN ONE WEEK

THIS manufacturer of metal cabinets found a lot of time was being taken to insert and drive screws in locking bars with hand screw drivers. Some screws were loose, others so tight that bars buckled, others were difficult to reach.

The Rotor Application Engineer suggested Rotor Midget Screw Drivers that have double-cushioned clutch (for torque control) and magnetic bits (to hold screws in while inserting in the hard to reach places.)

Results? Over 40 man-hours saved per week. The labor savings *alone* "paid off" the tool costs in the unusual time of *one week.*

Want to study *your* methods for similar benefits?

Call in the Rotor Tool Application Engineer or write for Catalog #35.

AIR O'TOOL

Just Part of ONE
BIG HARDWORKING FAMILY
for INCREASED PRODUCTION!
LESS TOOL COST!
GREATER ACCURACY!
W-S LATHE BITS
W-S REAMERS
W-S END MILLS
W-S TWIST DRILLS
W-S COUNTERBORES
W-S LATHE CENTERS
W-S TOOL BITS, MILLED AND BRAZED
W-S SHELL END MILLS
THE MOST COMPLETE LINE OF CARBIDE CUTTING TOOLS
Choose from a complete range of sizes . . . wide selection of styles . . . straight or taper shanks. Quick delivery on all W-S tools from your nearest Wendt-Sonis distributor.
FREE!
SEND TODAY for CARBIDE EQUIVALENT CHART, showing carbide manufacturers' grade recommendations.
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CARBIDE TIPPED CUTTING TOOLS
BORING TOOLS • CENTERS • COUNTERBORES • SPOTFACERS
CUT-OFF TOOLS • DRILLS • END MILLS • FLY CUTTERS
TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER
TURNING TOOLS • SPECIAL TOOLS

explain matters to the tool engineer, at the same time explaining the urgency of the job. Then the tool engineer should report the situation in full to the chief engineer who should decide the matter or take it up with the next higher official for final decision.

If the foreman thinks revisions could and should be made, he can hardly be excused for not giving an opportunity for correction. However, every one knows that foreman are sometimes pestered with busy-bodies who are not well or wisely informed but are anxious to get in the limelight. Such should be tactfully silenced. On the other hand a foreman should look for the best methods, but not always the easiest for him.

While these suggestions for quality improvement are considered going up the line of officers, the delay in delivery necessary should be passed upon, commencing as far up the line of officers as will be affected, thus giving everyone who may be affected a chance to do what they think best.

Such a procedure tends to ease any tension that might exist anywhere along the line.

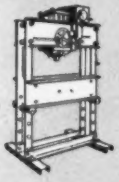
John Mark May
Watervliet, N. Y.

•

Theirs but to make the Die
But if when made it faulty be
An act of God may be the Plea.

Oh, the august dignity of the design office, the hush observed by one from the shops as he contemplates entering the sacred precincts of the temple of the Drawing Board and the Tee Square; almost he feels that he should "loose the shoes from off his feet." This, of itself could be sufficiently terrifying, but when the purpose is to ask if the great "I-am" of design may possibly have failed to consider some factor which has been notedly the quavering enquirer, this must almost be "his majesty" is not the D.O., as well as its great I-am, sacrosanct. Overstated, perhaps, particularly today, but old memories die hard. It is true, probably, that the really efficient designer is also humble, and a decent chap withal; one who would accept and examine a suggestion from whatever source it may come. It needs to be realized however, that there are right and wrong ways of making suggestions; the designer may be unduly sensitive but the shop man is sometimes unpleasantly cocky forgetting that the designer started from scratch and that, as a critic he has the designer's work on which to base his opinion. It is not necessarily clever to add another brick to an

Unusual machines for a wide variety of industrial applications



1. 150-Ton Electdraulic Press

Motor driven heavy duty hyraulic press; pre-set controlled tonnage; ram speed 12" down, 13" up per minute; ram travel 12"; bolster travel 28"; work can be fed from side or front; one operator can center work and control press.

2. Reamers, Dual Spiral

Dual spiral cutting action, one dual spiral reamer replaces five standard expansion reamers, straight or tapered shanks.

3. Die Sets

Features ball bearing bushing, long die life, perfect alignment, cleaner cutting.

4. Tool Post Grinders

Attachment for lathes, shapers, planers and millers; Applications: internal, external, face and taper grinding.

5. SSM Super Surface Grinder

Automatic Wet Surface Grinder with work capacity up to 62" long x 14" wide and 28" high. Revolving work table permits grinding successive surfaces without removing job from machine. Grinding wheel traverses automatically between stop limits. Four point precision level for setting up work.

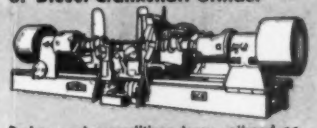
6. VAC Rotary Grinder and Vertical Lathe

Turns and grinds large work pieces of comparatively short length. Has 25" swing and can grind dies up to 18" x 18" square. Hand controlled vertical carriage travel, variable hydraulic, horizontal traverse of both cutter and grinding wheel.

7. Presses

For every purpose, sizes: 2-ton, 3-ton, 10-ton, 25-ton, 40-ton, 60-ton, and 150-ton, hand, hydraulic, air or motor driven.

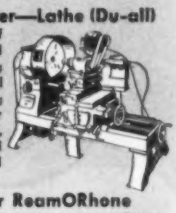
8. Diesel Crankshaft Grinder



Resizes and reconditions large railroad engine crankshafts up to 224 inches length, 40 inch swing; other models up to 382 inches length 60" swing. Also cylindrical grinding operations. All of the accuracy and features of the smaller world-famous Lempco automobile and truck crankshaft grinders.

9. HGX—Grinder—Lathe (Du-all)

Combines work of grinder, lathe and boring raill, 53" swing; automatic cross feeds! Hollow work spindle; face plate; grinds or turns large surfaces, internal and external tapers; small model ACX also available.



10. Speedmaster ReamORhone

Wet ream and wet hone on one machine, quickly interchangeable from reaming to honing.

11. Mobilcrane

Mobile shop crane eliminates need for overhead hoists and rails, capacity 2 tons, boom travel to 6'8" (Boom extension available).

12. Universal Cylindrical and Roll Grinder

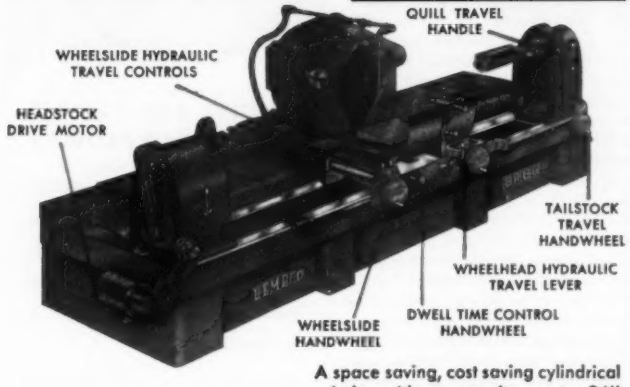
The CRCG cylindrical grinder reduces grinding costs on large cylinders and rolls up to 12 ft. long and 29" diameter. Its price is substantially lower than standard machines of similar capacity. Reasonable delivery.

13. Disc Surface Grinder

Tilt-table, spring floated disc grinder with coupled air suction and waterfall grit remover. For flat grinding of castings or other metallic surfaces up to 19" wide.

Universal Cylindrical and Roll Grinder—CRGC 96

automatic traverse between limits



A space saving, cost saving cylindrical grinder with a capacity up to 96" rolls and cylinders, maximum grinding diameter up to 29" (Larger capacities to specifications).

The grinding wheel traverses automatically between stop limits with a pre-set tarry before wheel is automatically reversed at end of stroke. Separate drives for wheel spindle, work spindle, hydraulic traverse and coolant pump. Write for details.

DELIVERY IN TERMS OF WEEKS RATHER THAN MONTHS

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Industrial Division
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LEMPCO

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LEMPCO PRODUCTS INC. (Industrial Division)
5490 DUNHAM ROAD • BEDFORD, OHIO

Gentlemen:
Kindly send additional details on the following equipment or machines:

☐ 1. 150-Ton Press ☐ 2. Reamers ☐ 3. Die Sets ☐ 4. Tool Post Grinders ☐ 5. SSM Surface Grinder 6. ☐ VAC Grinder-Lathe ☐ 7. Presses ☐ 8. Diesel Crankshaft Grinder ☐ 9. HGX Du-all Grinder, Lathe ☐ 10. ReamORhone ☐ 11. Mobilcrane ☐ 12. Cylindrical & Roll Grinder ☐ 13. Disc Surface Grinder.

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Allen-Type screws aren't necessarily Allen-Made. Get genuine Pressur-Formed Allen ○ Head screws in this black and silver box.
THE
ALLEN
MANUFACTURING COMPANY

unfinished wall. The foundation is the more important.

There is no need for cockiness on either side; it is the quality of each individual's work which matters and cockiness sometimes meets its due reward. The writer remembers a young man who, in the early days of jig-making, thought there was a dimensional error in the foreman's sketch. Not wishing to spoil the jig he, 5 ft 2 in. tall, approached the somewhat pompous and portly 5 ft 10 in. foreman, pointing out the apparent discrepancy. With unnecessary arrogance, he was told to work to the sketch. Annoyed, he went back and did so. Soon after the foreman went to the man and asked what the query had been. On its being pointed out, the foreman said it was wrong but the work had been done and the jig was spoiled. The observance of courtesy pays and arrogant discourtesy can have many reactions, one being absence of cooperation, but the company pays.

P. E. James
Lindum, England

THEIRS NOT TO REASON WHY

How WELL the illustrator seems to know the feeling of Ed who contemplates the progress of the snarling fuse! No Stalin cocktail can hold more explosive material than to have one department head inject himself into the territory of another. Not only that, but for an outsider to try to tell the engineering department that it was all wet in its design — Wow! Bolt down the hatches, mate, we're in for a blow! Were it not for the fact that the big shot was away for several days, leaving Ed out on a limb, this matter could be solved without any difficulty.

The answer to Ed's problem seems to be dependent upon the answers to several questions. What is the makeup of the organization and is there any established channel of procedure through which decisions of this nature should flow?

We are well aware that without proper delegation of authority nothing but chaos would ensue if every Tom, Dick, and Harry were to dabble into affairs of another department. The dangers of outside interference are certainly in evidence in any well-regulated setup providing that magnanimity governs the violated one's action.

Let us pluck the annoying feathers from this industrial bird so as to leave no annoying pin feathers in the way of hurt feelings or quickly-burned up sugar. We may have a dead duck when we get through but

TO GIVE YOU FASTEST ALLEN ○ HEAD DELIVERY

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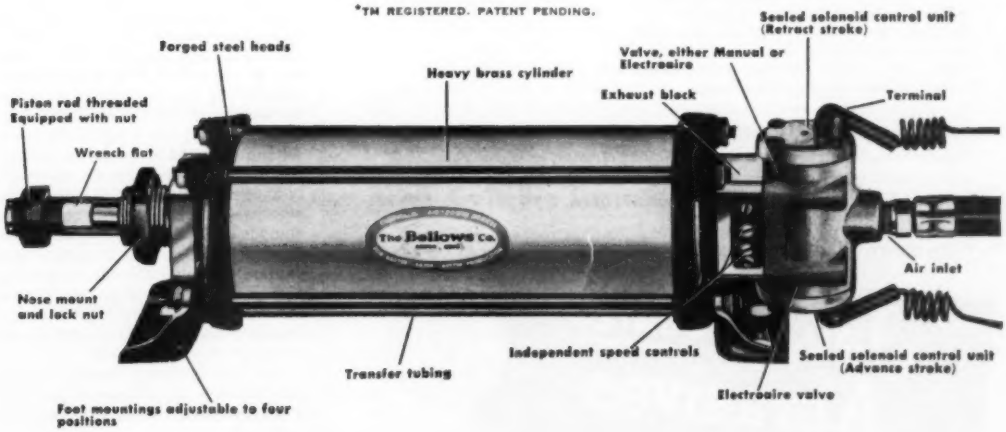
AKRON 9, OHIO

The Bellows Air Motor illustrated is Model BEM5-25 (2½" bore, 2½" stroke). Other bore sizes are 1", 1¼", 2½", 3⅜" and 4½". Any stroke length. Model shown is equipped with the ELECTROAIRE VALVE for full electrical control. Air Motors with manually operated valves are also available.

*TM REGISTERED. PATENT PENDING.



1217.

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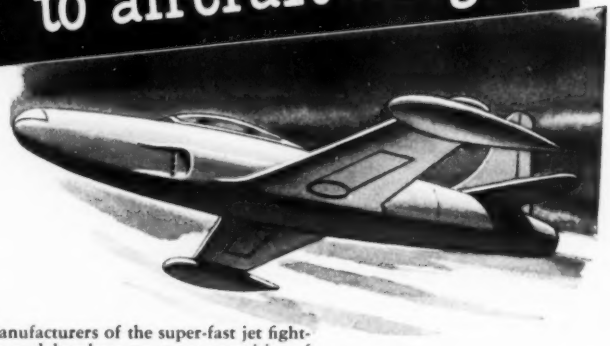
Tougher, longer-lasting Jewel Brand Weldisks are used for the heaviest industrial duty . . . such as the grinding of mammoth manganese bronze propellers for our nation's ships.

to aircraft wings



Manufacturers of the super-fast jet fighters and bombers use vast quantities of stainless steel finished with specially developed Jewel Brand Aluminum Oxide belts. These heat-resistant belts have helped set new production records.

THERE'S A JEWEL BRAND COATED ABRASIVE to do every job, large or small, and to do that job *quicker, cleaner,* at *lower cost!* Ask your industrial distributor or write for catalog. Abrasive Products, Inc., 561 Pearl Street, South Braintree 85, Mass.

SHARPER, TOUGHER

Jewel COATED Abrasives

CUT COSTS!

it will at least be free of barbs. Let us start with the worker, simply because he is the cause of the trouble in the first place.

The mechanic is given a job to do. It has been well thought out by the designing department and from ordinary understanding the design is "tops" in every respect. Old Tail-Feather Bill, who has been around some and holds a few aces up his sleeve, studies the design and finds, in his opinion, that the designer has slipped up somewhere. "Now, why in hell do they want to do this job this way?" he mumbles to himself. "I can cut down the cost of this job if they'll only do so and so."

Of course, if he has been led to understand that he is to do his job as directed by the drawing, regardless of his opinion, the difficulty of the moment would be eliminated. He wouldn't take the trouble even to curl up his mouth and say to his bench-mate, "Look at this cockeyed mess." Without such an understanding he could become a robot and carry out the instructions to the letter, as many are prone to do, even though he knows of a better way of doing the job.

If the man is on his toes he should call the foreman's attention to the idea he has in mind so as to relieve his own conscience as well as to effect a savings for the company. Having done this the next thing to be considered is, should Ed take it upon himself to consult the proper authority, now that his own boss is away temporarily, or should he let the worker down by keeping quiet?

No one likes to put his money on a losing horse. To continue to work on an idea that one feels to be inferior certainly tends to wreck a man's morale. If he suggests a better idea to his foreman and he in turn thinks well of it, he is going to look to that man to get some action. If his recommendations are ignored no one but the firm will lose in the long run. From here on the solution is up to Ed and the head of the designing department. If a fit is thrown, as usually happens with sensitive individuals who pride themselves in their superior ideas, Ed can say, "to hell with it", and go back to this worker and explain his futile attempt to get the idea incorporated. This would give the worker the knowledge that his foreman has some sense and would eliminate discouragement.

The whole thing resolves itself into whether the interest of the firm is paramount to that of a department head's ego.

J. Homewood
Ontario, Calif.

subcontracting NEWS

Subcontractors Get 42% of All AF Funds Received by Boeing

SEATTLE—More than 2000 subcontractors and suppliers aid in production of airplanes and other products manufactured by Boeing Airplane Co. at its Seattle and Wichita, Kans., divisions. Some 42.1% of all Air Force Funds received by Boeing for airframe costs is diverted to subcontractors, with another 25% going to material and parts suppliers.

The Seattle division feeds C-97 and B-50 work to 190 subcontractors, 90 of whom are in the Pacific Northwest. Wichita farms out $124,700,000 worth of B-47 subcontracts to 93 firms and plans to increase this total to $204,500,000 as additional items become available for subcontracting.

Representatives of Boeing Seattle's materiel department have visited and studied the plants of nearly 100 prospective subcontractors in the Pacific Northwest, plus many more in California and elsewhere. In addition, Boeing has interviewed several hundred others who chose not to file formal application for subcontracts when they learned of the problems involved.

Principal Boeing subcontractors are the Aeronca, Beech, Goodyear, Rohr, United and Bell aircraft corporations; Bendix Aviation Corp.; Cessna Aircraft Co.; Chance-Vought Aircraft Div. of United Aircraft Corp.; Cleveland Pneumatic Tool Co.; Coleman Co.; Dixon Mfg. Co.; Foote Bros. Gear & Machine Co.; Iron Fireman Mfg. Co.; Ryan Aeronautical Co.; A. O. Smith Co.; Swallow Airplane Co.; Texas Engineering & Mfg. Co., and Vard Inc.

Subcontracting Head Named For West Coast Tank Job

SAN JOSE, Calif.—Food Machinery & Chemical Corp. here has named Emil Neilson in charge of the subcontracting program for production of a new type military tank for Army Ordnance. Award of a $177,500,000 contract to the company for the tanks was announced in January. The company plans to subcontract only work which it cannot do in its own manufacturing divisions, and will use West Coast suppliers as much as possible.

$19 Million Award for Buses

KENT, Ohio—Twin Coach Company here has received a contract for 1509 dual-purpose, 37-passenger buses. They can be quickly converted into efficient ambulances to transport 14 to 21 litters. Total cost of the contract is $19,617,000.

Firestone to Build Tank Guns

AKRON, Ohio—A $4,600,000 contract to build guns for a new type tank has been obtained by Firestone Tire & Rubber Co. More than 600 persons will be employed on the order. Machinery brought from 16 points in the nation is being assembled for the big tank-rifle production line at Firestone, in the same building where the firm turned out gun carriages for 40mm Bofors anti-aircraft guns in World War II. Forgings and castings for barrels, breech blocks and breech rings are being provided Firestone by Army Ordnance.

Navy Orders Helicopters

WASHINGTON — The Navy has awarded contracts for development and construction of two experimental transport helicopters to carry pilot, co-pilot, passengers and litters or cargo to meet Marine Corps requirements for operation from all types of Navy vessels. The two designs selected are by Sikorsky Aircraft Div. of United Aircraft Corp., and MacDonnell Aircraft Corp.

$18 Million for Tank Tread Blocks

YOUNGSTOWN, Ohio — Truscon Steel Co. has been given a contract for $18 million for tank tread blocks. Subcontracts for rubberizing the tank treads have been given to Goodyear Tire & Rubber Co., B. F. Goodrich Co., and Firestone Tire & Rubber Co.

Electronics Pool Formed

SAN FRANCISCO—The Chamber of Commerce here has formed the San Francisco Bay Area Electronics Pool which will combine efforts in promoting defense contracts.

To Subcontract $12 Million

BOSTON — Curtiss-Wright Corp., Wood-Ridge, N. J., is prepared to place subcontracts with New England firms at the rate of $12 to $15 million per month, according to the New England Council. More than $517 million in prime defense contracts have been awarded New England firms up to March 7.

Procurement Consultant Named

WASHINGTON—The National Production Authority has appointed Dan R. Hudson of Birmingham, Ala., as special consultant to the Procurement Div. in the Office of Small Business. He will be responsible for contacting prime contractors and secondary contractors to see that small businesses receive every possible consideration as suppliers and subcontractors.

Army Gets Big Guns for Bulldog Tanks

ELIZABETH, N. J.—American Type Founders, Inc., has begun delivery to the Army of 76mm guns under its contract to arm the new 25-ton General Walker Bulldog light tanks.

At an inspection of the ATF gun plant here April 6, Army officers hailed the weapon—the first large gun produced by a civilian manufacturer since World War II—as superb and far superior in every way to the Russians' 88-mm tank gun.

ATF's new gun is a 16-ft, semi-automatic weapon, gyroscopically controlled so it can stay on a target even if the tank travels at 40 mph over rough terrain. It can be trained through a 360-degree circle, blasting in all directions. The Army, in its own arsenals, built the first two of these new 76mm guns, experimentally and largely by hand methods, and the commercial production at ATF is based on these prototypes.

(Continued next page)

Let's Make the Most of Our Productive Might

THE productive might that has given America the most fruitful peace-time economy in history—the productive might that has backed to a victorious limit in two twentieth-century wars the fighting men who inevitably are our first line of defense—is facing an even greater test. It must not—it cannot be wasted!

The era of fighting and winning wars, and settling back during interims to "business as usual," is past. When it passed, how it passed, doesn't matter. What does matter is that from here on in, perhaps, there'll be no more "indolent" years—no more building of bathtubs to the exclusion of battleships; no more butter at the expense of bombs.

But America's unmatched productive might is fully capable of building bathtubs *and* battleships, of providing butter *and* the bombs requisite to war or to prevention of war; capable, that is, if properly employed—if none of it is wasted.

More And Better Tools Needed

THIS means that the manpower and womanpower left to industry after military needs have been satisfied, must be given every cost-cutting tool, every time-, labor- and muscle-saving aid known to man. It means that these tools must be employed intelligently and efficiently.

At the Fourth National Materials Handling Exposition,* to be held in the International Amphitheater in Chicago, April 30—May 4, 1951, the CLARK EQUIPMENT COMPANY'S INDUSTRIAL TRUCK DIVISION, along with several hundred other producers of materials-handling equipment, will show to industry the newest, the most efficient and the most effective tools in the world for *making the most of America's productive might.* It is a show that no industrial executive can afford to miss—it is the MUST of the Industrial Show year. It is a MUST not only from the point of economy and profits within your own operation—but also from the point of *accomplishing the vast production necessary to the new Military Economy without imposing harsh austerity on the Civilian Economy.*

More Power For Manpower—In Action

CLARK will show and demonstrate its full LEADERSHIP LINE of fork-lift trucks, powered hand trucks and industrial towing tractors. Among them will be several machines never before shown—some of them not yet in production. The exhibit also will present special handling attachments of proved worth, and demonstrations of their rich usefulness.

By all means attend and study this tremendously important show. And make a special point of seeing the CLARK exhibits and demonstrations of the best machines in their field for giving MORE POWER to MANPOWER.

*(*We'll be glad to supply registration—admission tickets. Just address your request to the Clark Equipment Co., Industrial Truck Division, Battle Creek 3, Michigan, telling us how many you want.)*

(Continued from page 233)

Manufacture is under way in an ATF building constructed during World War II for turning out 37mm, 57mm and 75mm guns.

Suppliers of integral parts of the ATF guns are National Forge & Ordnance Co., Irvine, Pa.; Struthers-Wells, Inc., Titusville, Pa., and the Watertown (Mass.) Arsenal, for rough tube forgings; Ohio Steel Foundry, Lima, for breech ring castings; E. V. Camp, Birmingham, Ala., and Lebanon Steel Foundry, Lebanon, Pa., muzzle brakes; and the Sandy Hill Brass & Iron Works, Hudson Falls, N. Y., evacuators.

From Elizabeth the guns will go to National Rubber Machinery Corp., Clifton, N. J., for additional recoil mechanism; then to Erie Proving Ground for proof firing, and finally to Cleveland Tank Plant, operated by Cadillac Div., General Motors Corp., for installation in the Bulldogs.

Air Force to Exhibit Parts

CHICAGO — The Midcentral Air Procurement District of the Air Force will stage here April 30-May 9 an exhibit of aircraft parts for which subcontracting work will be let. Some 80 prime contractors will display actual parts to be made by the subcontractors, with blueprints and drawings. Engineering personnel will be on hand to discuss the production problems involved. The exhibit will be held at the Navy Pier in 50,000 sq ft of floor space. The show follows the successful meeting of prime and subcontractors arranged recently by the New York Air Force Procurement District.

Pool Facilities for Defense Work

OAKLAND, Calif.—Incorporation of Pacific Defense Industries, Prime Contractors, an organization to pool resources of industrial plants on the Pacific Coast for obtaining and handling defense contracts, has been announced by Albert D. Schwaner, president. As prime contractor, PDI will assume full responsibility for completion of contracts, allocating portions of the work to plants which can best perform respective tasks.

Tool Firm Wants Subcontractors

CHICAGO—Scully-Jones & Co., here is looking for subcontractors to machine tools and tool parts. Man to contact is Ben Raver, materials coordinator, at Scully-Jones, 1901 South Rockwell St., Chicago 8, Ill.

LATEST DEFENSE CONTRACTS LISTED

WASHINGTON — There's business for potential subcontractors in the prime contracts listed below, awarded by procurement offices of the Army, Navy and Air Force. Manufacturers should contact the firms listed, not the government procurement agencies, for subcontract work on these awards.

ARMY ORDNANCE AWARDS

Ordnance Tank-Automotive Center, Detroit

Mayes Tool Co., Detroit—pinions, final drive.

Wagner Electric Corp., St. Louis—cylinders, wheel, hydraulic brake assembly; cup & insert assembly; screws, brake cylinder adjusting wheel.

Blador Electric Co., St. Louis—grinders, portable bench.

Forway Tool & Die Co., Hazel Park, Mich.—fixtures, boring, master and rod bearing.

Hesse Carriage Co., Kansas City, Mo.—cab closure, hard top, for truck, tractor.

Metro Engineering & Mfg. Co., Inc., Detroit—cab closure, hard top, for cargo carriers, and for trucks.

Algonac Mfg. Co., Algonac, Mich.—cab closure, hard top, for trucks.

Stoughton Cab & Body Co., Stoughton, Wis.—cab closure, hard top, truck, dump.

Federal Motor Truck Co., Detroit—flange, steering brake assembly.

Meteor Motor Car Co., Piqua, Ohio—automobile, ambulance.

Northwestern Auto Parts Co., Minneapolis—block, pillow propeller shaft.

Mack Mfg. Co., Plainfield, N. J.—trucks, tractor, 10-ton 4x2; dump trucks.

Oneida Products Corp., Canastoga, N. Y.—cab closure, hard top, for truck.

American Steel Fabricators, Altoona, Pa.—lift, track wheel.

DeVilbiss Co., Toledo—gun, paint, spray, syphon-feed.

United Motors Service Div., General Motors Corp., Detroit—regulator, insulator; master switches.

Allen Electric & Equipment Co., Kalamazoo, Mich.—blower, turret ventilator assembly.

Lanagan & Hoke, Inc., Philadelphia — kit, tachometer assembly.

Bee-Line Co., Davenport, Iowa—hydraulic press, axle straightening.

Blood Brothers Machine Co., Allegan, Mich.—propeller shafts.

Stamping Products & Mfg. Co., Detroit—cab closures, hard top, for trucks.

Pentagon Mfg. Co., Detroit—cab closures, hard top, for trucks.

U. S. Axle Co., Inc., Pottstown, Pa.—axle shafts.

Bedford Gear & Machine Products Inc., Bedford, Ohio—gears.

Terry Machine Co., Waterford, Mich.—ring, block transmission, main shaft.

American Bosch Corp., Springfield, Mass.—governors, engine magneto assembly.

Novi Equipment Co., Novi, Mich.—booster, engine governor assembly.

Clayborne Mfg. Co., Chicago—engine overhaul stands.

Bower Roller Bearing Co., Detroit—bearings (roller, cylinder).

Precision Automotive Components Co., St. Louis—repair kits, engine carburetor.

M-N Metal Products Co., Hazel Park, Mich.—sumps, oil differential assembly.

Transmission & Gear Co., Dearborn, Mich., pinion, final drive wheel.

AC Spark Plug Div., General Motors Corp., Flint, Mich.—filters, fuel assembly.

International Harvester Co., Washington, D. C.—dump trucks, 5 ton, 4x2; trucks, Hi-Lift.

Hercules Steel Products Corp., Galion, Ohio—steel cargo bodies.

General Electric Co., Schenectady, N. Y.—relays, cut-out generator regulator assembly.

Pontiac Motor Div., Detroit—8-passenger station wagons.

Valentine Welder & Mfg. Co., Detroit—welders, electric arc.

Trico Products Corp., Buffalo, N. Y.—vacuum windshield wiper assembly.

Clark Cable Corp., Cleveland—harness.

GMC Truck & Coach Div., Pontiac, Mich.—housing, forward rear axle assembly.

Adams Mfg. & Engineering Co., Huntington Park, Calif.—deflectors, exhaust, right assembly.

Willys-Overland Motors, Inc., Toledo—gear, steering, w/o wheel assembly.

Ford Motor Co., Washington, D. C.—stake and platform trucks; dump trucks; panel delivery; pickup.

G & O Mfg. Co., New Haven, Conn.—radiator assembly.

Fruehauf Trailer Co., Detroit—semi-trailer, refrigerator, 10 ton.

Herman Body Co., St. Louis—steel cargo bodies.

Allis-Chalmers Mfg. Co., Milwaukee—gears, shaft, bearing, bracket.

Imperial Brass Co., Chicago—valves, shut-off; valves, fuel.

Airport Service Equipment Co., Inc., Mineola, N. Y.—trucks, H-lift, stake & platform.

Detroit Ordnance District

Ford Motor Co., Dearborn, Mich.—assemblies for 3.5-in. rockets; tanks, 90mm gun, M48; concurrent spare parts, facilities.

Monarch Governor Co., Detroit—fuze, rocket, dummy.

Standard Steel Spring Co., Armor Plate Div., Detroit—facilities to increase production of armor plate.

King-Seeley Corp., Ann Arbor, Mich.—metal parts for primer, percussion.

Continental Motors Corp., Detroit—power plant assemblies for the M46 medium tank & concurrent spare parts; facilities to provide for manufacture of AV-1790 engine.

Kelsey-Hayes Wheel Co., Detroit—shells, HE, M1-105mm.

Fisher Body Div., General Motors Corp., Detroit—tanks, 90mm gun, M48; concurrent spare parts, facilities.

Grand Rapids Brass Co. Div., Crampton Mfg. Co., Grand Rapids, Mich.—4.5-in. rockets, HE; facilities.

Masco Screw Products Co., Dearborn, Mich.—metal parts for fuzes, .05 second delay.

St. Louis Ordnance District

Cabot Shops, Inc., Pampa, Tex.—forgings, for tube, gun.

Chefford Master Mfg. Co., Fairfield, Ill.—metal parts for fuses; incendiary shells.

Lincoln Engineering Co., St. Louis—boosters.

National Rejectors Inc., St. Louis—boosters.

Nesco, Inc., Chicago — body assembly for shells; cartridge cases.

Rheem Mfg. Co., Richmond, Calif.—shells.

(Continued next page)

Extensive Subcontracting Planned by Pontiac

PONTIAC, Mich. — The two new arms contracts recently announced by Pontiac Motor Div., General Motors Corp., will be extensively subcontracted. For the $45-million amphibious cargo carrier contract, Continental Motors will supply engines, and about 500 outside suppliers will be used on production parts, in addition to many more who will help tool the job. For the $12.5-million Army rockets order, an estimated 32 outside suppliers will be required for parts and production materials, plus 250 others to tool the job.

Arlie F. Johnson, manufacturing manager at Pontiac, has been placed in charge of all defense output. Roland Satterle has been named superintendent of transmission production on the cargo carrier, and Jesse C. Hunter, superintendent of assembly. Sheet metal plant superintendent William L. Kelley will head all sheet metal operations, both for the cargo carrier and for normal automotive production. G. Robert Scharf is superintendent (days) of the Army rocket project, and Paul Tabor for the second shift.

Rheem Has Lockheed Work

NEW YORK—Rheem Mfg. Company's Aircraft Div. has signed a contract with Lockheed Aviation Corp. for fabrication and assembly of components of the Navy's P2V-6 patrol bomber. Lockheed also has increased a previously announced contract with Rheem to include several additional components of the T-33 jet trainer and the F-94 all-weather fighter. Work on tooling will be started immediately at Rheem's South Gate, Calif., plant. Fabrication and assembly are scheduled to begin in July.

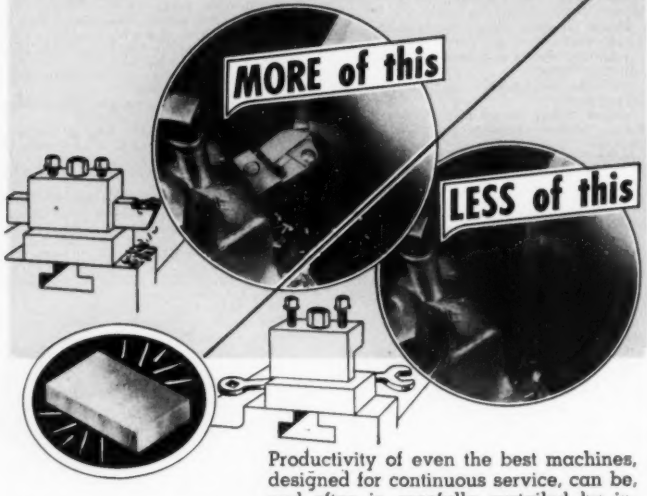
Temco Gets Trainer Award

DALLAS—The Air Force has placed an order with Texas Engineering & Mfg. Co., Inc., here for a substantial quantity of two-place TF-51 Mustangs, a single-engine propeller-driven trainer.

$1.5 Million for Artillery Fuses

RIVERSIDE, N. J.—The Keystone Watch Case Div. of Riverside Metal Co. is opening an entire floor of its plant to process a $1.5 million prime contract for some 800,000 artillery fuses.

HOW TO REDUCE "LOST-BUT-PAID-FOR" MACHINE HOURS



Productivity of even the best machines, designed for continuous service, can be, and often is, woefully curtailed by inferior tools that wear rapidly and require frequent shutdown for replacement. Production is thereby recurrently interrupted, *but* costs never cease. Lost time must be paid for.

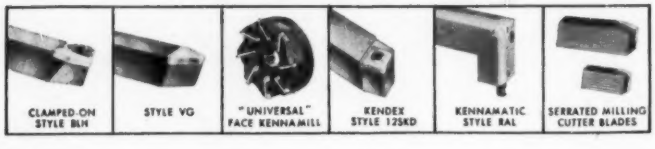
Kennametal tools, on the contrary, have a remarkably long service life. Outstanding durability is inherent. They work more hours per day, spend less time in the grinding room, and thus help reduce idle machine time, make operators more efficient, reduce tool inventory. Superior performance is attained because the physical structure of Kennametal is sound and uniform — the desired properties of hardness, strength, and toughness are consistent.

These outstanding characteristics are achieved through a unique coordination of manufacture and all-inclusive control from raw materials to finished product — refinement of all carbides directly from ores, oxides, and by-products — processing of these carbides into Kennametal compositions by exclusive methods and patented techniques — fabrication of complete tools and wear-part designs that fully utilize the distinctive properties of Kennametal.

For those who wish assistance in developing the most efficient tool applications Kennametal Inc. maintains a corps of competent Field Engineers in all important industrial centers. Their services are available for helping you to reduce lost-but-paid-for machine hours.

KENNAMETAL *Inc.*, Latrobe, Pa.

MANUFACTURERS OF SUPERIOR CEMENTED CARBIDES AND CUTTING TOOLS THAT INCREASE PRODUCTIVITY



ORDNANCE AWARDS . . . continued

Watervliet Arsenal, Watervliet, N. Y.

Sandy Hill Iron & Brass Works, Hudson Falls, N. Y.—parts for 90mm M3A1; evacuators for 90mm and 76mm guns.

Wyott Mfg. Co., Cheyenne, Wyo.—parts for 60mm mortar M2.

York Electric & Machine Co., Inc., York, Pa.—parts for 60 mm mortar M2.

Tailer & Cooper, Inc., Brooklyn — parts for 90mm gun, 8-in. how., and 200mm gun.

Rollins Engine & Machine Co., Inc., Nashua, N. H.—parts for 75mm rifle M20.

Frankford Arsenal, Philadelphia

Chase Brass & Copper Co., Inc., Waterbury, Conn.—blanks, rotating, Class B gilding metal.

Budd Co., Philadelphia — 90mm chemical shells, tooling & facilities.

Action Mfg. Co., Philadelphia — parts for telescopes.

Brickner-Kropf Machine Co., Muskegon, Mich.—perforating dies, automatic.

Wildman Mfg. Co., Norristown, Pa.—parts for mount periscopes; spare parts & special tooling for telescope mounts.

CORPS OF ENGINEERS

Chicago Procurement Office

International Harvester Co., Melrose Park, Ill.—cranes.

Metallizing Co. of America, Chicago—metallizing equipment.

Good Road Machinery Corp., Minerva, Ohio—snow plows.

Four Wheel Drive Auto Co., Clintonville, Wis.—carriers.

Little Giant Tree Feller Co., Dallas, Tex.—spare parts for Little Giant Co. equipment.

Bucyrus-Erie Co., Elyria, Ohio—spare parts for Bucyrus-Erie equipment.

Waukesha Motor Co., Waukesha, Ohio—spare parts.

La Crosse Trailer Co., La Crosse, Wis.—spare parts.

Industrial Engr. & Parts Co., Chicago—spare parts.

How Military

WASHINGTON—Over 50% of military contracts now being let are negotiated. Advertised bids are not completely out the window, but since the declaration of a national emergency by President Truman on Dec. 16, the armed forces have had broad powers to negotiate.

The bible for procurement—The Armed Services Procurement Regulations (ASPR)—lists 18 conditions under which it is possible to negotiate a contract. These range from purchases less than a thousand dollars, to purchases outside the U. S. Just in case any possibilities are overlooked, the catch-all provisions of the national emergency, the public exigency, and purchases in the interest of national defense, are included.

But even though the conditions under which negotiation is permitted are all-including, there are no set rules for the procedure in negotiating a contract. It's still

Euclid Road Machinery Co., Euclid, Ohio—trucks, rear dumps.
Gardner Denver Co., Quincy, Ill.—diggers & tampers.
Thew Shovel Co., Elyria, Ohio—spare parts for Thew Shovel Co. equipment.
Daybrook Hydraulic Corp., Bowling Green, Ohio—spare parts.
Gar Wood Industries, Inc., Wayne, Mich.—spare parts.
Boeing Airplane Co., Seattle—tanker kits.
Jack & Heintz Precision Industries, Inc., Cleveland—inverters; generators.
General Electric Co., Schenectary, N. Y.—instrument spare parts; tachometer indicators.
Bendix Aviation Corp., Teterboro, N. J.—automatic pilot components; radar sets; boost controls.
Bendix Products Div., South Bend, Ind.—carburetors & spare parts; carburetor assembly.
Kollsman Instrument Co., Elmhurst, N. Y.—pilot's stand by compass.

NAVY AWARDS

Bureau of Ordnance, Washington 25, D.C.

Delco Appliance Div., General Motors Corp., Rochester, N. Y., 12 volt DC type A motors for use in assembly of CD-14 2 mechanisms.
L. N. Schwien Engr. Co., Los Angeles—double synchros.
Barden Corp., Danbury, Conn.—maintenance of bomb director sets.
Bishop & Babcock Mfg. Co., Cleveland—depth charge booster cans with metal containers, and special tools therefor.
Eclipse Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.—60-cycle synchro control transformers.
West Bend Aluminum Co., West Bend, Wis.—aluminum cartridge tanks.

Naval Gun Factory, Washington 25, D. C.

Gallmeyer & Livingston Co., Grand Rapids, Mich.—feed surface grinders.
J. H. Elliott Co., Washington, D. C.—precision jig boring machines.
Gleason Works, Rochester, N. Y.—generators and equipment.
Koppers Co., Inc., Metal Products Div., Baltimore—torpedo launching kits.

Bureau of Ships, Washington 25, D. C.

Granite State Machine Co., Inc., Manchester, N. H.—antenna; rotary switches.
Bowen & Co., Inc., Bethesda, Md.—sound reproducers, three speed.
Electronic Instrument Co., Inc., Brooklyn—electronic multimeters.
National Co., Inc., Malden, Mass.—radio receiving sets.
Dynamic Electronics, New York, Inc., Glendale, N. Y.—U amplifiers.
Foster Wheeler Corp., New York—inlet and outlet superheater headers for boilers.
National Supply Co., Torrance, Calif.—spare stern propeller shaft assembly.
Winner Mfg. Co., Inc., Trenton, N. J.—personnel boats, 28 ft.
Steddart Aircraft Radio Co., Hollywood, Calif.—radio interference and field strength meters.
Babcock & Wilcox Co., New York—superheater seal plates for Dixie class.
Camden Forge Co., Camden, N. J.—spare stern propeller shaft assembly.
General Electric Co., Syracuse, N. Y.—two-frequency commercial radar.
Worthington Pump & Machinery Corp., Harrison, N. J.—fire pumps.
McKiernam-Terry Corp., New York—anchor windlass.
Safety Car Heating & Lighting Co., Inc., New Haven, Conn.—motor generators.
Allis Chalmers Mfg. Co., Milwaukee—electric propulsion machinery and controls.
Yarnall-Waring Co., Philadelphia — superheaters.
Trauisen & Co., Inc., Long Island City, N. Y.—refrigerators.
American Engineering Co., Philadelphia—anchor windlasses.

Electronic Supply Office, Great Lakes, Ill.

Roanwell Corp., Brooklyn—headsets.
General Electric Co., Syracuse, N. Y.—water jackets.

Philadelphia Naval Shipyard

Kollmorgan Optical Corp., Brooklyn—repair parts for periscopes.
Elliott Co., Ridgway, N. J.—repair parts for main generators.
Electric Dynamic Works, Electric Boat Co., Bayonne, N. J.—spare parts for motor generators.
R. G. LeTourneau, Inc., Peoria, Ill.—tractors, wheeled, prime mover, including scraper, carryall.
York Corp., Los Angeles—ice machines.
Construction Machinery Co., Waterloo, Iowa—concrete mixers.

U. S. Naval Construction Battalion Center, Port Hueneme, Calif.

Price Battery Corp., Hamburg, Pa. — batteries.
Wood Mfg. Co., North Hollywood, Calif.—roadmixers.
Crane Co., Los Angeles—power roof ventilators.
American Steel Dredge Co., Inc., Ft. Wayne, Ind.—crawler tractors with bushwacker.
Aldrich Co., Wyoming, Ill.—boilers, steam generating.
Hapman-Dutton Co., Kalamazoo, Mich. — steam boilers.
Cleaver-Brooks Co., Milwaukee — steam boilers.
Dewey-Shepard Boiler Co., Inc., Peru, Ind.—steam boilers.
Orr & Sembower, Inc., Reading, Pa.—steam boilers.
Wayne Mfg. Co., Pomona, Calif. — rotary sweepers.
American Hoist & Derrick Co., St. Paul, Minn.—cranes and attachments.
Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Lima, Ohio—crane equipment.

Ships Parts Control Center, Naval Supply Depot, Mechanicsburg, Pa.

Woodward Governor Co., Rockford, Ill.—repair parts for diesel engines.
Commercial Engineering Co., Washington, D. C.—repair parts for oil clarifiers.
Korfund Co., Inc., Long Island City, N. Y.—repair parts for diesel engines.
Arma Corp. Brooklyn—ball bearings.
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.—repair parts for plotting equipmet.
Weston Electrical Instrument Corp., Newark, N. J.—repair parts for electrical measuring instruments.
Grove Regulators Co., Oakland, Calif.—repair parts for regulators.
Westinghouse Air Brake Co., Wilmerding, Pa.—repair parts for air controls.
Insinger Machine Co., Philadelphia—repair parts for galley equipment.
Leece-Neville Co., Cleveland—electric motors, generators, regulators and various repair parts.
Cutler Hammer, Inc., Milwaukee — repair parts for controllers.
Hercules Motors Corp., Canton, Ohio—repair parts for diesel engines.
United Transformer Co., New York—repair parts for transformers.
A. C. Spark Plug Div., General Motors Corp., Flint, Mich.—tachometers and various repair parts.
Timken Roller Bearing Co., Canton, Ohio—bearings.
Leland, Brinckerhoff & Co., Washington, D. C.—repair parts for gasoline engines.
Norberg Mfg. Co., Milwaukee, Wis.—repair parts for diesel engines.
Leslie Co., Lyndhurst, N. J.—repair parts for regulators.
Allis-Chalmers Mfg. Co., York, Pa.—repair parts for pumps.
Combustion Equipment Div., Todd Shipyards Corp., Elmhurst, N. Y.—repair parts for fuel oil burners and atomizers.
United Motors Service Div., General Motors Corp., Detroit—repair parts for starters, generators and ignition systems; repair parts for motors, generators and controls.
Hall-Scott Motor Div., ACF-Brill Motors Co., Philadelphia—repair parts for gasoline engines.

(*Continued on page 240*)

Contracts Are Negotiated

largely a matter for horse-trading. Just how good a "deal" you can get depends on your bargaining ability with the contracting officer.

• **Procurement by negotiation** can be either selective or competitive. When it's selective, the government asks a specialty contractor to enter into negotiation talks for the manufacture of a specific item. This is usually for highly specialized equipment such as certain types of radar or loran gear, proximity fuses, or aircraft specialties.

Competitive negotiation takes place when a group of suppliers are invited to submit estimates for possible contract negotiation. All are experienced in making the same item—such as trucks—and therefore are in the same competitive picture.

• **The procedure:** When a service decides it wants to negotiate a contract, it solicits price quotations from a manufacturer. The quotation requires essentially the same information as an invitation to bid. The price quotation must be supported by statements and breakdowns of estimated costs including a separate analysis for cost of special tooling required.

Before you get together with the contracting officer, the service looks into your history to check your business reputation and how you stack up in the competitive picture. (This is especially true with negotiations involving service performance contracts.) Then they compare your estimated prices with that of your competition.

The next step is to call you in to talk over terms. Comes now a discussion of qualities of supplies offered, delivery requirements, price aspects of important subcontracts, cost sharing considerations and the utilization of the most desirable contract. These items are ironed out across the bargaining table until agreement is reached.

HOW A FEW CENTS CAN MAKE A BIG DIFFERENCE IN PRODUCTION . . .

DENSITY of 14.75 GMS/cc
(steel = 8.60) assures uniform structure and freedom from porosity.

81 ROCKWELL "C" HARDNESS
(hardest steel—68 "C") of talide tip cuts toughest metals — at highest speeds.

2 MICRO-INCH FINISH
is diamond lapped—holds keen edge longer.

275,000 p.s.i. TRANSVERSE RUPTURE STRENGTH
takes heaviest cuts and feeds—withstands shock and abuse.

INDUCTION-BRAZED
to insure strongest bond between tip and shank.

EXTRA RIGID SHANK
of cold drawn high-carbon steel is tough, stiff and strong.

● As a tool man or production boss, you know what can be done with Talide Tools and Tips.

They cut and machine many times faster, stay sharp longer and remove more pounds per grind. Talide Carbide eliminates hours of "downtime." These advantages, as you well know, mean much longer runs at lower unit cost. In addition, production is increased without buying additional machine tools.

How about consistency of quality? Will your next order of Talide perform as the last lot? The answer is obvious—Talide Tools and Tips are used, year after year, in the best production shops. Sales moved upward every year.

The numbering system for Talide Tools makes ordering and identification easy. Warehouses stock all standard sizes and grades for same-day or 24-hour delivery. Place your order direct with warehouses in Newark, New Jersey; Youngstown, Ohio; Detroit, Michigan; or Chicago, Illinois.

Complete specification, engineering and ordering information is contained in Talide Tool Catalog 50-G, available to you.

SINTERED CARBIDES
METAL CARBIDES CORPORATION
TALIDE
YOUNGSTOWN, OHIO
HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION
YOUNGSTOWN 7, OHIO *Pioneers in Tungsten Carbide Metallurgy*
CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

These are the special purpose steels that set Crucible apart from most other steel companies. For these special steels must be so carefully compounded, and so sensitively handled that, in most cases, they cannot be mass produced.

Such steels include those designed for use under severe conditions of heat or cold, stress, strain, or wear. For example: Crucible high-speed tool steels are in the whirring machines that cut and shape the toughest metals; Crucible hollow drill steels work around-the-clock digging mines and quarries, and Crucible stainless steels put a sparkle with a purpose in our kitchens.

If you have an application that calls for a special steel, Crucible's metallurgical staff stands ready to help you. CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.

CRUCIBLE first name in special purpose steels

51 years of Fine steelmaking

Spaulding Works, Harrison, N. J. • Midland Works, Midland, Pa. • Park Works, Pittsburgh, Pa. • Spring Works, Pittsburgh, Pa.
National Drawn Works, East Liverpool, Ohio • Sanderson Halcomb Works, Syracuse, N. Y. • Trent Tube Company, East Trop, Wisconsin

You saw this ad in the Saturday Evening Post, Time, Newsweek, Business Week

especially tool steels!

Crucible Tool Steels have been pampered pets every day of the 51 years Crucible has led in this highly specialized field. That's why tool steel users, assured of getting what they want from Crucible, have kept us the country's number one tool steel producer.

Since Industry is constantly opening new fields that require new tool steels, Crucible's interest in their further development and improvement goes on unabated. You can profit from the wealth of knowledge gained by Crucible in the application of these steels to thousands of uses. The unparalleled experience of our metallurgists is freely available to you.

That's why it pays to get *all* your tool steel requirements from Crucible.

write for your selector today

If you haven't gotten your handy tool for selecting tool steels, write: Dept. A, Crucible Steel Company of America, 405 Lexington Avenue, New York 17, New York

3 colors, 9" diameter

CRUCIBLE first name in special purpose steels

51 years of Fine steelmaking **TOOL STEELS**

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DENVER • DETROIT HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH • PROVIDENCE • ROCKFORD SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

subcontracting NEWS

(Continued from page 237)

Naval Supply Depot Procurement Branch, Great Lakes, Ill.

General Electric Co., Chicago—steering motors.
Continental Electric Co., Inc., Newark, N. J.—propulsion motors.
Kollman Instrument Corp., Elmhurst, N. Y.—geared induction motors.

U. S. Navy Purchasing Office, Washington 25, D. C.

Haynes Stellite Div., Union Carbide & Carbon Corp., New York—solid metal cutting tools.
Federal Products Corp., Providence, R. I.—indicators, test, dial type, reversible.
Erie Foundry Co., Erie, Pa.—hammer, air operated, 12,000-lb rated capacity.
Pell Cable Cutter Co., San Francisco—cutters, cable, hydraulic pressure.
Stewart Mfg. Co., Washington, D. C.—sprayer outfits.

NAVY AVIATION AWARDS

Bureau of Aeronautics, Washington 25, D.C.

Friez Instrument Div., Bendix Aviation Corp., Towson, Md.—wind measuring sets.
Hamilton Standard Div., United Aircraft Corp., East Hartford, Conn.—propeller assemblies integral oil control assembly.
Air Research Mfg. Co., Los Angeles—air turbine starters.
Arma Corp., Brooklyn—compass adapters.
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J. — generators; compass adapters; indicators & transmitters, oil pressure; manifold pressure transmitters; amplifiers.
Pesco Products Div., Borg-Warner Corp., Bedford, Ohio—engine driven pumps.
Interstate Engr. Corp., El Secundo, Calif.—valve, anti-blackout.
Jack & Heintz Precision Industries, Inc., Cleveland—inverters.
Kollman Instrument Corp., Elmhurst, N. Y.—altimeters; periscopic sextants; airspeed indicators.
Trad Television Corp., Asbury Park, N. J.—radio test sets.
Video Corp. of America, New York—interphone amplifiers.
General Electric Co., Schenectady, N. Y.—generators & regulators; indicator, tachometer.
Lewis Engineering Co., Naugatuck, Conn.—indicator thermometers.
Learn Laboratories, Inc., New York—antenna.
Lunn Luminates, Inc.—radomes.
Durham Aircraft Service, Inc.—Woodside, L. I., N. Y.,—drift sights.
Polytechnic Research & Development Co., Inc., Brooklyn—signal generators.

Naval Air Material Center Supply & Fiscal Dept., Philadelphia

Hufford Machine Works, Inc., Redondo Beach, Calif.—stretch presses for BuAeronautics Industrial Reserve.
Morgan Smith Co., York, Pa.—cylinder assembly for arresting gear spares.
American Engineering Co., Philadelphia—hydraulic pumps for catapult; high pressure pumps.
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.—jig borers, for BuAeronautics Industrial Reserve.
DeVlieg Machine Co., Ferndale, Mich.—jig borers, for BuAeronautics Industrial Reserve.

Aviation Supply Office, Philadelphia

Curtiss Wright Corp., Propeller Div., Caldwell, N. J.—blade gear for airslip program.
Vickers Inc., Detroit—pump, hydraulic engine driven for aircraft.
United Aircraft Products, Inc., Dayton—fuse assembly, hydraulic for F9F and PV2 aircraft.
Chance Vought Aircraft Div., United Aircraft Corp., Dallas, Tex.—maintenance spare parts for various aircraft.
Walter Kidde & Co., Inc., Belleville, N. J.—valve, oxygen cylinder, high pressure for use on all aircraft.
Walworth Co., Camden, N. J.—valves, gage.
Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.—indicator, oxygen flow, for use on various aircraft.
General Electric Co., Philadelphia—tachometer, generator for use on aircraft; bearings; generators.
Foote Brothers Gear & Machine Corp., Chicago—actuator, canopy for aircraft.
South Wind Div., Indianapolis—heaters for use on helicopters.
Douglas Aircraft Co., Inc., Santa Monica, Calif.—tank assembly for aircraft.
Houde Engineering Div., Buffalo—damper shimmy for aircraft.
Bendix Products Div., Bendix Aviation Corp., South Bend, Ind.—maintenance parts for Pratt & Whitney engines; maintenance parts for use on various injection and float type carburetors.
U. S. Gauge Div., American Machine & Metals, Inc., Sellersville, Pa.—gauge parts.
Lewis Engineering Co., Naugatuck, Conn.—testers, thermometer parts.
Jamestown Metal Corp., Jamestown, N. Y.—cabinets, filing, for shipboard use.
Scintilla Magneto Div., Bendix Aviation Corp., Sidney, N. Y.—magneto assembly for Pratt-Whitney engines.
Aeroproducts Div., General Motors Corp., Dayton, Ohio—actuators for use on various aircraft.

AIR FORCE AWARDS

Fairchild Camera & Instrument Corp., Jamaica, N. Y.—photographic equipment.
Bobrich Products Corp., New York—gun-heaters.
Romec Div., Lear, Inc., Elyria, Ohio—pressurizing equipment.
Queen City Mfg. Co., Cincinnati—truck spare parts.
Greer Hydraulics, Inc., Brooklyn — cabin heater testers.
Cornelius Co., New Brighton, Minn.—compressor systems.
George D. Roper Corp., Rockford, Ill.—fuel pumps.
Hunter Mfg. Co., Cleveland — photo-lab heater.
Aeroflex Laboratories, Inc. — Long Island City, N. Y.—aircraft camera mounts.
Keene S. Jackson, South Pasadena, Calif.—gunsight parts.
Connecticut Telephone & Equipment Corp., Meriden, Conn.—telephone control groups.
Bachman Wholesale Co., Rochester, N. Y.—gun turrets, parts.
Dayton Aircraft Products Co., Dayton, Ohio—hydraulic jacks.
Electric Storage Battery Co., Cleveland—batteries.
Ampco Metal, Inc., Milwaukee — propeller cans.
Webster Chicago Corp., Chicago—radar receivers.
Stewart-Warner Corp., Chicago — transformers.
Liquidometer Corp., Long Island City, N. Y.—fuel indicators.
Gilfillan Brothers, Inc., Los Angeles—radar sets.
Guardian Electric Mfg. Co. Chicago—control switches.
Douglas Aircraft Co., Inc., Santa Monica, Calif.—aircraft spare parts.
Fairchild Engine & Airplane Co., Hagerstown, Md.—aircraft spare parts.
Lockheed Aircraft Corp., Burbank, Calif.—aircraft spare parts.
Edo Corp., College Point, N. Y.—float and strut assembly.
Allison Div., General Motors Corp., Indianapolis—engine spare parts.
Avco Mfg. Corp., Cincinnati—motor assemblies.
Raytheon Mfg. Co., Waltham, Mass.—magnetrons.
Minneapolis-Honeywell Regulator Co., Minneapolis—automatic pilot parts.
Munston Mfg. & Service, Inc., New York—control panels.
G & M Equipment Co., N. Hollywood, Calif.—oscillators.
Keystone Watch Case Div., Riverside Metal Co., Riverside, N. J.—position indicators.
Aviation Engineering Corp., Woodside, N. Y.—amplifiers.
Lewis Engr. Co., Naugatuck, Conn.—temperature indicators.
Federal Telephone & Radio Corp., Clifton, N. J.—ground radio transmitters.
Pratt & Whitney Aircraft, East Hartford, Conn.—misc. spare parts.
Timken Roller Bearing Co., Canton, Ohio—roller bearings.
Revere Copper & Brass, Inc., Detroit—aluminum tubing.
Weatherhead Co., Cleveland—aircraft hardware.

PRODUCTION SCHEDULES improved by subcontracting MACHINE and TOOL WORK

TO

FORD BROTHERS, INC.
Established 1911
23 Illinois St., Buffalo 3, N. Y.
ALL MODERN EQUIPMENT
#5 Ram Turret Lathes — #2 & 3 Mills
Radial Drills — Grinders

What's YOUR problem?

R. L. Hansen of Green Bay, Wisconsin, is the Standard Oil lubrication specialist who recommended STANICUT and solved the cutting-oil problems of this machine job shop.

He and other lubrication specialists are located throughout the Midwest. They are ready to give you prompt and expert attention. If you have a lubrication problem, the lubrication specialist nearest your plant is the man to see.

He has been specially trained for his counseling job in a Standard Oil Lubrication Engineering School. In addition, plenty of practical experience qualifies him to give thorough and reliable service.

A phone call or post card to the nearest Standard Oil Company (Indiana) office will obtain a lubrication specialist's services for you. When he calls, ask him to discuss with you the performance records of the following fine products:

STANICOOL HD Soluble Oil—Because it contains additional compounding, this soluble oil possesses not only the cooling ability of an emulsion but also the ability to give better tool life and finer finishes than can be obtained with a conventional soluble oil.

STANOSTAMP Compounds—Here are three established products for stamping or heavy drawing operations of either low-carbon or alloy steels. Water can be added to these paste compounds to provide the most economical application. STANOSTAMPS offer maximum protection for dies and work. These compounds can be readily removed in conventional washing equipment.

Why use two when one will do?

"IS THERE one cutting oil that can handle the wide variety of jobs performed in automatic screw machines—give good tool life on steels and achieve fine finishes on brass and aluminum?"

This question was asked by the operators of a midwest machine job shop. The Standard Oil lubrication specialist whom they consulted recommended STANICUT Cutting Oil 137BCS.

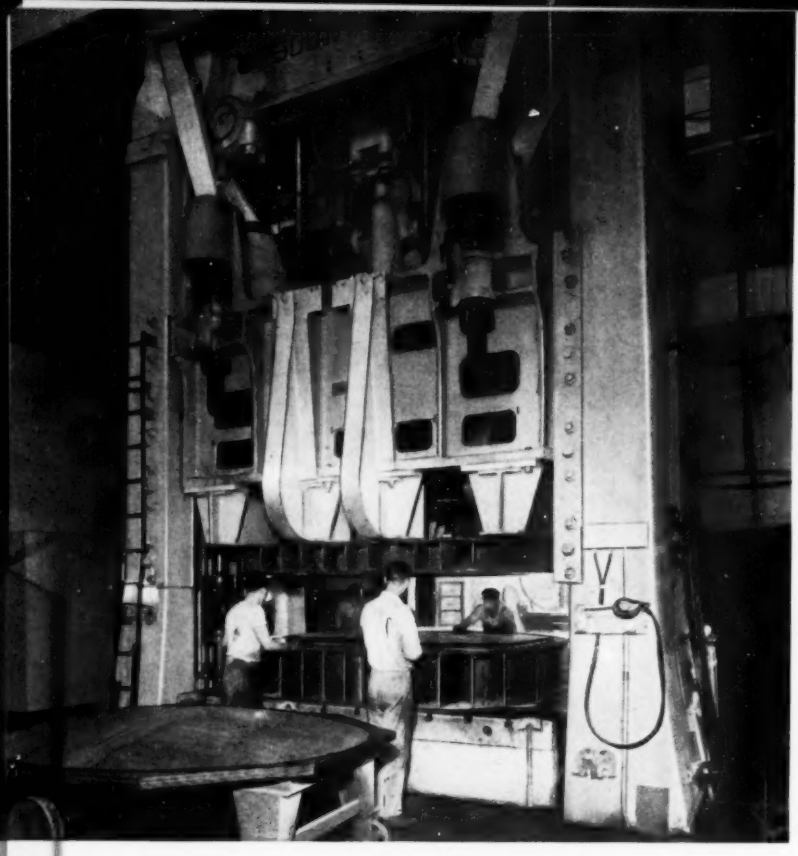
In the performance of this versatile cutting oil, the operators found the answer to their problem. STANICUT has been used with equal success on all of the jobs in the shop.

Compared with cutting fluids previously tried, it has given 50% longer tool life. Production has been maintained at a high level. This is indicated in the threading of ⅜" steel stock, where STANICUT permits top cutting speeds. On brass and aluminum, STANICUT provides the satisfactory finish desired.

STANICUT
TRADE MARK
Cutting Oil

This company learned from practical experience the advantages of STANICUT Cutting Oil. A consultation with a Standard Oil lubrication specialist may result in savings on a wide variety of operations and may mean more efficient production for *your* plant. A Standard Oil lubrication specialist is within easy reach of your company. Write Standard Oil Company (Indiana), 910 S. Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (INDIANA) STANDARD



Answer to a "Pressing" need . . .

TROUBLE-FREE hydraulic operation of a new toggle press was particularly important to the Brown Steel Tank Company of Minneapolis. Such operation would keep costly inspections of the hydraulic unit at a minimum—production at a maximum.

A Standard Oil lubrication specialist was called in. He recommended STANOIL Industrial Oil for this vital hydraulic job. During three years of hard, continuous service (hydraulic unit operates 2000 P.S.I. maximum), STANOIL has stayed on the job and has permitted efficient hydraulic operation. It has not been necessary to inspect the hydraulic unit in all of this time. A recent sample test showed the hydraulic oil to be in excellent condition.

STANOIL will give long oil life and trouble-free service in a wide variety of equipment: speed reducers, head stock gears, auxiliary turbines, compressors, as well as hydraulic systems. STANOIL is fortified to combat rust and corrosion.

STANOIL
TRADE MARK
Industrial Oil

Your nearby Standard Oil lubrication specialist is ready to explain how your plant may obtain maximum benefits from STANOIL and other high-quality petroleum products.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois for his prompt attention.

What's YOUR problem?

Meet C. K. Olsen, lubrication specialist in Standard Oil's Minneapolis office.

Consulted by the Brown Steel Tank Company, he recommended STANOIL Industrial Oil as the answer to their needs. As a result, he helped the company realize significant savings in operating costs.

Standard Oil lubrication specialists are located throughout the Midwest. Just phone or address a card to the nearest Standard Oil Company (Indiana) office for the services of the specially trained lubrication specialist near your plant.

With his help, find out how many different oils in your plant can be replaced by STANOIL Industrial Oil on such applications as:

Air compressors . . . no sticking or clogging of valves, less oil consumption in splash or circulating systems.

Speed reducers . . . less wear of gears and bearings during frequent cold starts or prolonged high-temperature operation.

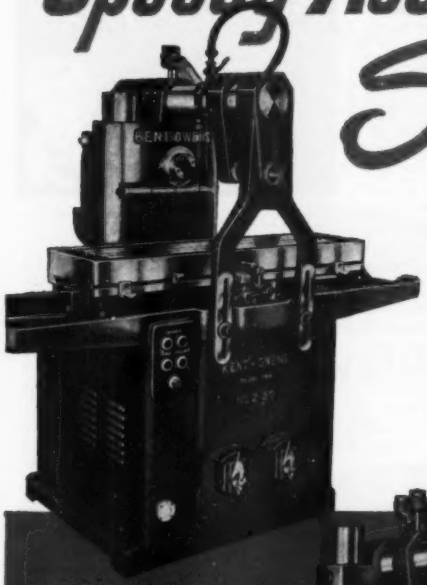
Steam turbines . . . freedom from emulsions and sludge, fewer oil changes necessary.

Ring-oiled bearings . . . rings function immediately on starting, less bearing wear.

Circulating and bath systems . . . one oil for a wide variety of jobs.

STANDARD OIL COMPANY (INDIANA)

Speedy Accurate Milling Saves Labor!



On countless jobs—Kent-Owens Milling Machines have shown ability to turn out work with top speed and high accuracy. They're designed for rapid, easy set-up and operation. Rugged . . . with twin-post head mounting that assures balanced load—no chattering. Practical features throughout to help you *produce more* . . . with *lower costs!* Write for bulletins on the Kent-Owens Standard line . . . including wide range of hydraulic and hand operated machines. Also, let our engineers help you with tooling and special machine requirements.

Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20 20" table travel . . . 12" x 12" table . . . full automatic hydraulic feed.

No. 2-20 DS Double Spindle for two milling operations . . . 20" table travel . . . 12"x12" table. Hydraulic feed.

No. 2-20V 20" table travel . . . vertical spindle with speed range 32 to 1280 R.P.M. . . . 12"x12" table. Hydraulic feed.

Call on KENT-OWENS

For Milling Machines

don't scrap metal by turning!

...save by Swaging

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TORRINGTON SWAGERS

The Torrington Rotary Swaging Machine uses every bit of stock. With 4000 hammer blows a minute, swaging reduces, sizes, rounds, tapers and points rod, wire and tubing. It makes metal tougher and more resilient. It hammers away minor surface defects.

Torrington Swagers are built to a mechanical perfection based on our 42 years' swaging experience. Send today for your free copy of the illustrated booklet describing the machine and the method.

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Send the coupon today for your free copy of this booklet.

Please send a copy of "The Torrington Swaging Machine" to:

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LITTLE PLANT SCHOOLROOM

THE ANSWER to the question as to the value of, or need for, post-graduate courses for foreman could be as dangerous to give as that put to a political heckler, "have you left off beating your wife."

Of the value of educated foremen, there can be no doubt; nor can it be doubted that a foreman should have some knowledge of the nature of the work for the supervision of which he is, or is to be, responsible. Are not the two needs obvious? But is not the realization of this need for education, whether of the three Rs or of a technical character somewhat belated? Is it not like putting the horse behind the cart—a long way behind. Surely in the selection of candidates for foremanship, it is as important to know the degree of intelligence and education available as it is to insure the candidate can see, walk and hear. mental sight is equally important.

Lack of education today would seem to suggest a lack of energy, capacity or desire. He who does not desire is hardly likely to excel; the child who has to be forced to do his music lessons will be unlikely to shine as a musician and the machinist, who is content to be uneducated until old enough to be considered for foreman's duties, would seem to have advertised his unfitness for these.

Is there not, however, another side to this question? The responsibilities of a "Boss" include, directly or indirectly, the choice of staff. If that choice be such that he feels they should be sent back to school, is not the weakness that of himself. If this be so, should he also not consider taking a post-graduate course himself. The writer has always felt that a lack of efficiency at the bottom implies a similar state of affairs nearer the top. If this be the case, then criticism at the bottom indicates the need

"All right, who is the wise guy?"

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at factory prices

Save time and money—assure yourself of maximum quality and performance by specifying on Boston Gear quality products stocked at these Authorized Boston Gear Distributors and near you!

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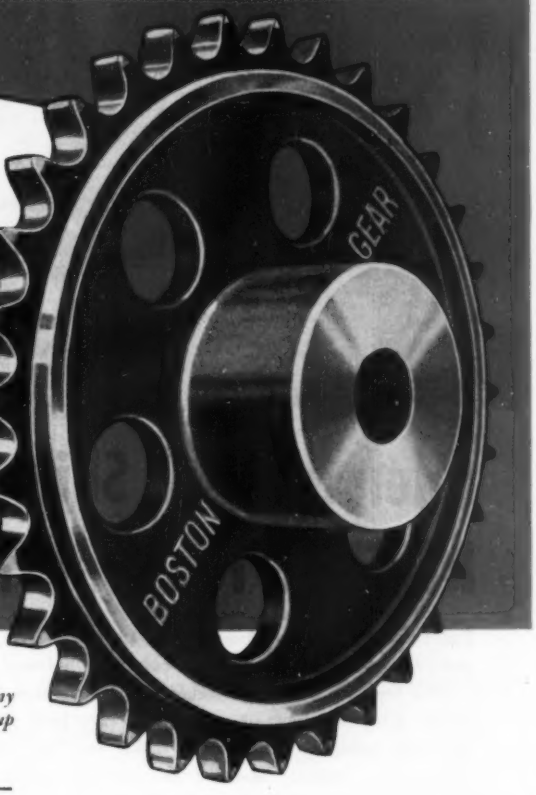
WHY DOES A BOSTON *Gear* Sprocket...

PUT EXTRA MONEY IN YOUR *Pocket?*



"Sprockets are sprockets", you may say. *"Any old sprocket will do. Might as well pick 'em up cheap."*

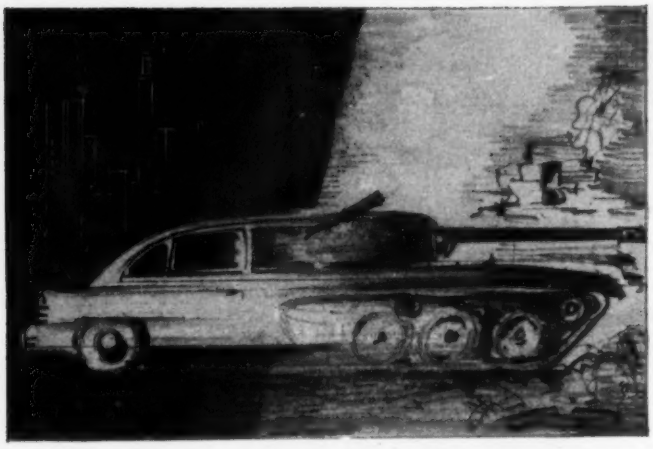
But stop and think! Roller chain costs money—is **increasingly hard to get.** Cheaply made sprockets with carelessly cut teeth chew up chain **fast** — reduce its life 20% or more. Sprockets that do not run true — that lack balance and correct tooth formation — waste power, too.

Chain — power — cost of shutdowns for replacement — check these against the small "saving" in first cost between a "bargain counter" sprocket and a sprocket of genuine BOSTON *Gear* quality design, materials, workmanship, finish and accuracy. **BOSTON Sprockets are cut with the same care and precision as BOSTON Gears.**

With Sprockets as with Gears, Reductors, Ratiomotors, Bearings and hundreds of other items of transmission equipment, it pays to standardize on BOSTON — readily available from nearby stock. (See adjacent list of Authorized Boston Gear Distributors).

Boston Gear Catalog No. 55 contains complete information and prices on over 4000 stock items. Write for free copy.

BOSTON *Gear* Sprockets and Chain cover a complete range of chain drive service from "flea" power to forty horse power.



Helping You Shift to DEFENSE PRODUCTION

Practical solutions to the complex problems that accompany the switch to defense work can often be found at your nearby Ryerson Plant. Experienced Ryerson steel men will gladly work with you. Not only can they help you select the right steels for the job at hand, but they are well-informed on military specifications and the latest government procedures.

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So call us for steel—and steel information. We can't promise to fill all your steel requirements, but we can assure you that we will do our very best to help.

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for confession at higher levels. Unless better choice be made, the spectacle of a number of "Backwardians" including a Boss may be seen wending their way to school to pick up that knowledge which will make them industrially useful. It may be that the standard of selection of staff may be raised thus butting the horse in his rightful place before the cart in the shafts; what a vista.

P. E. James
Lindum, England

PACK RATS

ESTABLISHMENT of a liberal feeling between employer and employees is well worth while for all concerned.

In practically all lines of manufacture, some employees have at times use for some of their employer's products, or for some of the small parts that enter into the manufacturing of the firm's output.

The natural and most common approach for the item is through the foreman who should be given authority to make such transactions as he may feel justified in doing.

It is best that each transaction be recorded on a special duplicate billing slip, one copy to be turned into the office for record purposes and the other given to the employee, receipted or marked "No Charge" by the foreman.

The items should be sold to the employee at cost price, and in case of very cheap items, the foreman should be allowed to give them.

With such a system in use, the office is kept in touch with the foreman's acts in all transactions which keeps him — the foreman — from showing any partiality, and affords an opportunity to check on the amount of no charge receipts turned in should they become excessive. In fact all concerned can know the policy of the organization.

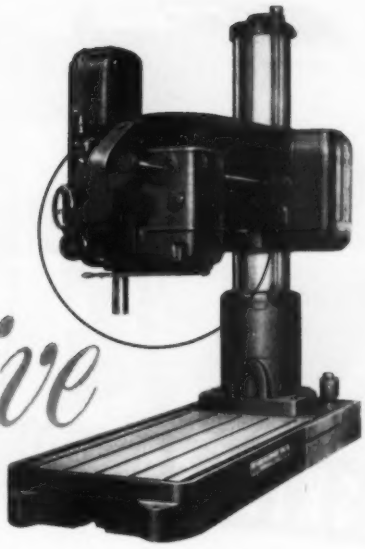
Abel Blakeman
Watervliet, N. Y.

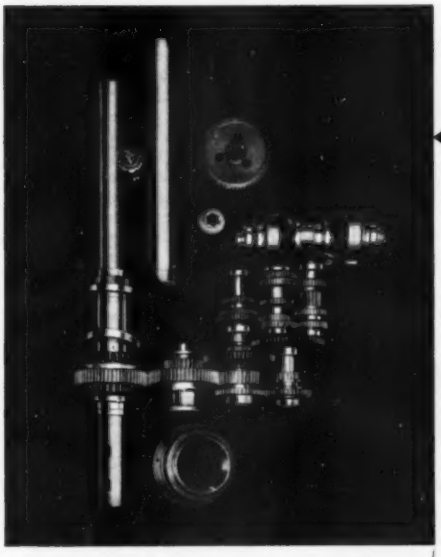
"My wife annealed the bacon and case-hardened the biscuits."

comparison proves Carlton's

low hung drive

is without comparison





the main drive gear in all Carlton Radial Drills is placed in the *lowest part of the head.*

It drives on the *largest diameter* of the spindle, *closest to the cutting tool* . . . a principle well established by its wide use in planers, lathes and milling machines.

When you compare other radial drill driving mechanisms with Carlton's Low Hung Drive, you'll see why the overwhelming preference is for Carlton.

Thanks to the Low Hung Drive, Carlton can use an extra large spindle. And since the drive is always applied on the largest diameter of the spindle, it minimizes spindle twist . . . permits the use of higher speeds and greater feeds.

This principle—together with all ball bearing construction, low, centralized push button controls, modern lubrication, power clamping of arm, head and column, and Carlton's many other advantages—means increased "hole" production for you.

Why not write us today for bulletins describing the Carlton Radial Drills you need?

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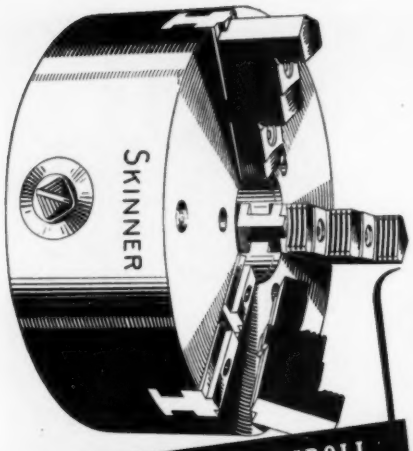
THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO



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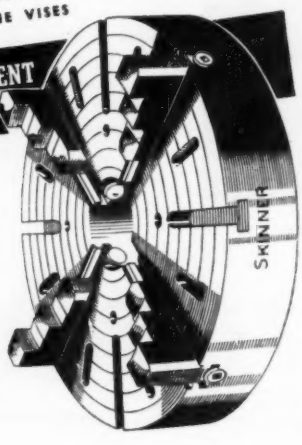

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NEW BOOKS

PERSONNEL PROBLEMS UNDER MOBILIZATION — *Personnel Series Number 135. Published by American Management Association, 330 W. 42nd St., New York 18, N. Y. 62 pages. Price $1.25.*

Selected papers from the Fall Personnel Conference of the American Management Association are included in this booklet. Security and loyalty considerations, foreseeable selective service requirements, recruitment and utilization of manpower, and approaches to economic education are among the topics discussed.

•

HANDBOOK OF PERSONNEL FORMS AND RECORDS — *By Eileen Ahern, Published by American Management Association, 330 W. 42nd St., New York 18, N. Y. 227 pages (paper-bound). Price $3.50.*

Forms and records for major activities of personnel administration are analyzed and illustrated in this book, AMA's Research Report No. 16. More than 150 pages are devoted to reproduction of selected forms. Reading matter discusses these forms, bringing out objectives of the particular activity and principles governing its administration. Included are forms in the following broad categories: application forms, interview records, job evaluation, attendance and absence records, manpower inventory, merit rating, training, employee discipline, grievance records and suggestion systems.

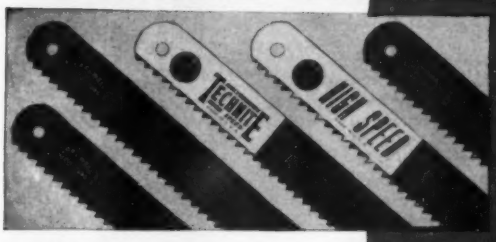
•

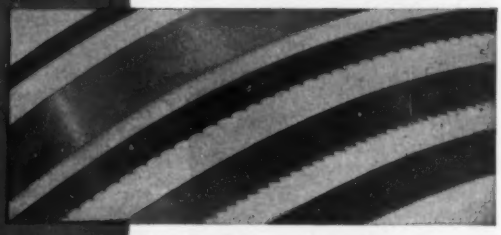
MATERIAUX DE CONSTRUCTION MECANIQUE (ENGINEERING MATERIALS) —*By H. Wiegand. Published by Dunod, 92 Rue Bonaparte, Paris 6, France. 304 pages. Price $7.50.*

Translated into French, from the original German, this book gives the answers to a host of problems facing the design engineer. Without getting into the highly technical field of metallurgy, except where absolutely necessary, it describes the characteristics and composition of the various materials and operations which change their properties.

Intended primarily for engineers, it will, nevertheless, be found a valuable aid to technical-school students able to read French.

MADE WELL TO CUT WELL





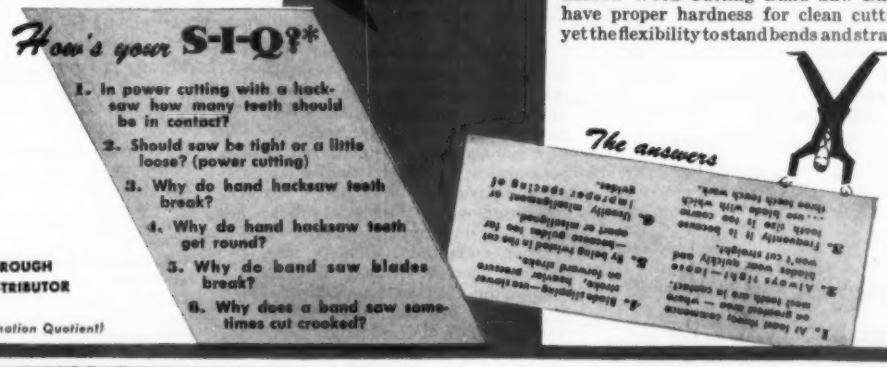
HACKSAW BLADES

Power blades: HIGH SPEED, made of 18-4-1 tungsten high speed steel; TECHNITE, made of molybdenum high speed steel; SAFETECH, high speed blade, softer backing for safety, shatterproof.

Hand blades: HIGH SPEED, TECHNITE, FLEXTUNG, FLEXLOY, *and* HARDTUNG; these five types available in two lengths, and four different tooth counts, cover every requirement from skilled tool room work to home work shop.

BAND SAW BLADES

Capewell Flexible Back Hard Tooth Band Saw blades for metal cutting are made from carefully alloyed and processed tool steel and only the full tooth is hardened, giving a tough, flexible body complemented by sharp, precisely set and hardened teeth. They are available in Contour saws, Cut-off saws and Skip Tooth saws. *Capewell Spring Temper* band saws are made from a tough, resilient alloy steel suitably hardened throughout. Capewell narrow Wood Cutting Band Saw Blades have proper hardness for clean cutting, yet the flexibility to stand bends and strains.


How's your S-I-Q?*
1. In power cutting with a hacksaw how many teeth should be in contact?
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4. Why do hand hacksaw teeth get round?
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6. Why does a band saw sometimes cut crooked?
*(Saw Information Quotient)
The answers

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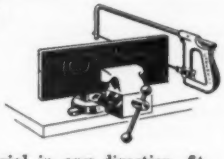
"DAFILES"

THE *new* 360° ALL PURPOSE SAW



"Dafiles" cut almost any material in any direction, fit Capewell or other standard hacksaw frames when used with Capewell Dafile-links; can be used for high speed cutting in power jig . . . ideal wherever you have a radius cutting problem, the need for sharp turns, or intricate patterns to cut.

THE CAPEWELL MANUFACTURING CO.
65 Governor Street, Hartford, Connecticut

Gentlemen: Please send me more information on
☐ Hacksaw Blades; ☐ Band Saw Blades;
☐ Dafiles.

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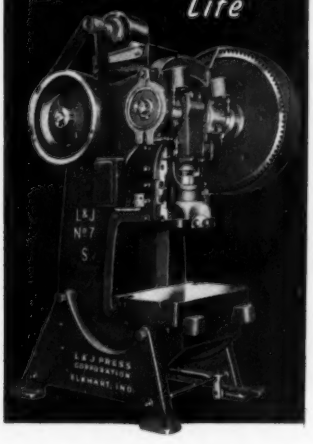
SCABS

L&J PRESSES
for Longer Die Life



Exceptionally rigid frames; extra long gibs and large bearing areas, accurately machined, prolong die life. There's no guesswork about frame deflection in L&J Presses. A unique testing method measures the actual deflection of every design under load.

This is only one of the features of L&J Presses that contribute to economical, dependable production. It will pay you to find out more about them. Made in 6 to 80 ton capacities.

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1629 Sterling Avenue
ELKHART, INDIANA

KINEMATICS OF MACHINES *(5th Edition)* — *By Austin H. Church, Professor of Mechanical Engineering, New York University — previous editions by Prof. George L. Guillet. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 299 pages. Price $4.00.*

The author has retained much of the material and style that characterized the Guillet editions while changing particular chapters for better understanding.

The chapter on velocity and acceleration in plane motion has been rewritten and an article on Coriolis' acceleration added. The section on gearing has been revamped to shift the emphasis to the generating principle of producing gear teeth, which has largely replaced the use of formed milling cutters. Other chapters and proofs have been revised and all the illustrations are new.

The many practical applications given help make the laws and proofs more meaningful.

•

THE THEORY AND PRACTICE OF INDUSTRIAL RESEARCH—*By David Bendel Hertz, assistant professor of Industrial Engineering, Columbia University; industrial consultant. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 385 pages. Price $5.50.*

This book tells how to apply the principles of sound business management to research operations. It assumes that research is subject to planning and can be organized to assure management of efficient use of personnel without restriction on creative ability.

Starting with theoretical background, and analytical material on creative mentalities, problem solving, and scientific method, the book applies these concepts to industrial research. It proceeds from general topics such as the industrial background of research and the start of a research program to specific topics such as personnel selection and administration, cost factors, research facilities, patents, and relationships both within the research group and with other groups in the company and in government, professional societies, and other research organization.

Information and methods described in this text will assist management in arriving at a sound policy regarding project selection, and will aid research administration in objectively examining the progress of work.

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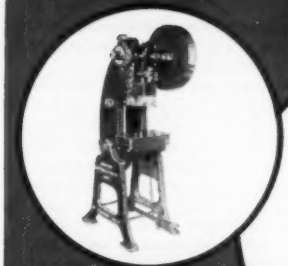

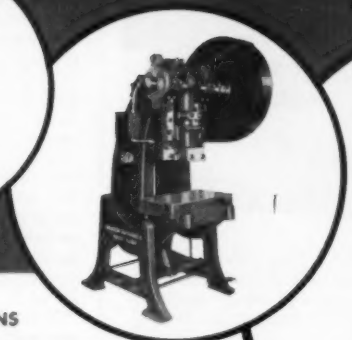

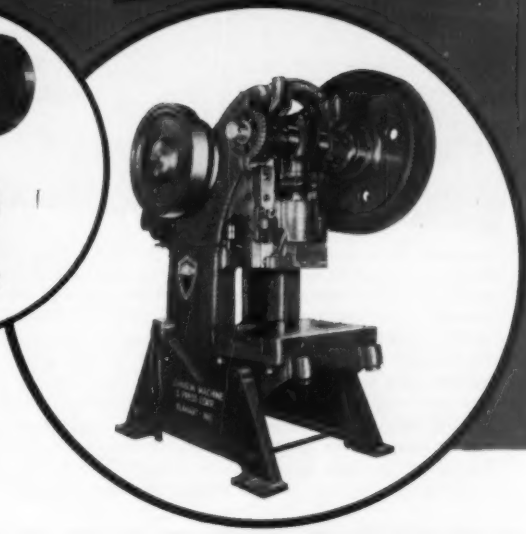

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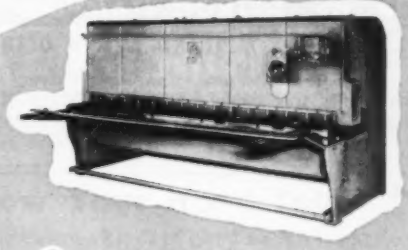

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THE ENGINEERING METHOD—*By John Charles Lounsbury Fish. Published by the Stanford University Press, Stanford, California, 183 pages. Price $3.*

The reasons for engineering as a profession, as well as how engineering should be done, will be better understood for the reading of this book. Not necessarily a textbook, it covers ground that should be roughly understood by a student who is deciding whether or not to take up engineering seriously. It also gives a good general engineering method of operation to those who must hire or work with engineers.

Engineering has been defined as the practical application of the results of the scientific laboratory; or making raw research pay off for human comfort and protection. A similar rough definition of the engineering method might be applying only facts to a problem; not guesses. Yet informed guesses, estimates, or guesstimates are often important parts of engineering work. The book explains how and when such approximations can be made if they apply.

The author outlines the engineering method in four steps:

1. *Ratification*—or making sure the problem is understood fully.
2. *Evaluation*—or obtaining an answer to the problem.
3. *Checking*—or looking through the process to detect and correct any errors.
4. *Reporting*—or recording and announcing the result of the process.

In a number of practical examples of engineering problems, the author presents the engineering method, shows how non-engineering people might solve or muddle the problem, shows the difference when engineers work on it, and exhibits the process through which the engineer solves the question.

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BEHAVIOR OF ENGINEERING MATERIALS *—By H. W. Gillett, Battelle Memorial Institute. 395 pages. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $6.50.*

This book deserves a place in the libraries of engineers and manufacturing men. The late Dr. Gillett set out to write non-technically about metals for non-metallurgists. What he ended up with is an exceptionally interesting and stimulating volume, easy to read. Somehow, he introduced many nuggets of "know-how" about metallurgy in such fashion that the reader takes them in his stride but recognizes the worth of the material.

Dr. Gillett stimulates the reader. He shows repeatedly that stodgy acceptance of routine tests for properties of materials is dangerous, because such tests frequently bear no relationship to service conditions. By freeing the mind of unreal concepts, and citing the experiences of well-known investigators, he prepares the reader for many practical observations about stresses, fatigue raisers, crack propagation, etc.

After developing basic concepts for six chapters, the author uses the next nine to discuss the behavior of the principal commercial metals and alloys. Special considerations like machinability, fabricating techniques, corrosion, wear, and high temperatures are given due weight. In short, the entire purpose of the book is to aid the non-metallurgist in making a sound engineering selection among metals available. Dr. Gillett performed a much-needed service, because he has provided the means whereby designers, metallurgists, production engineers, purchasing agents and sales engineers can understand each other.

•

POWER TOOLS AND HOW TO USE THEM—*By W. Clyde Lammey. Published by Popular Mechanics Press, 200 East Ontario St., Chicago 11, Ill. 144 pages. Price $2.50*

Here is the answer to the home workshop craftsman's problem of what power tools to buy, and what to do with them. Generously illustrated, the book explains the operation of each tool, and tells what projects it is best suited for. Special sections are devoted to shop planning, woodworking tools, metalworking tools and other light power tools.

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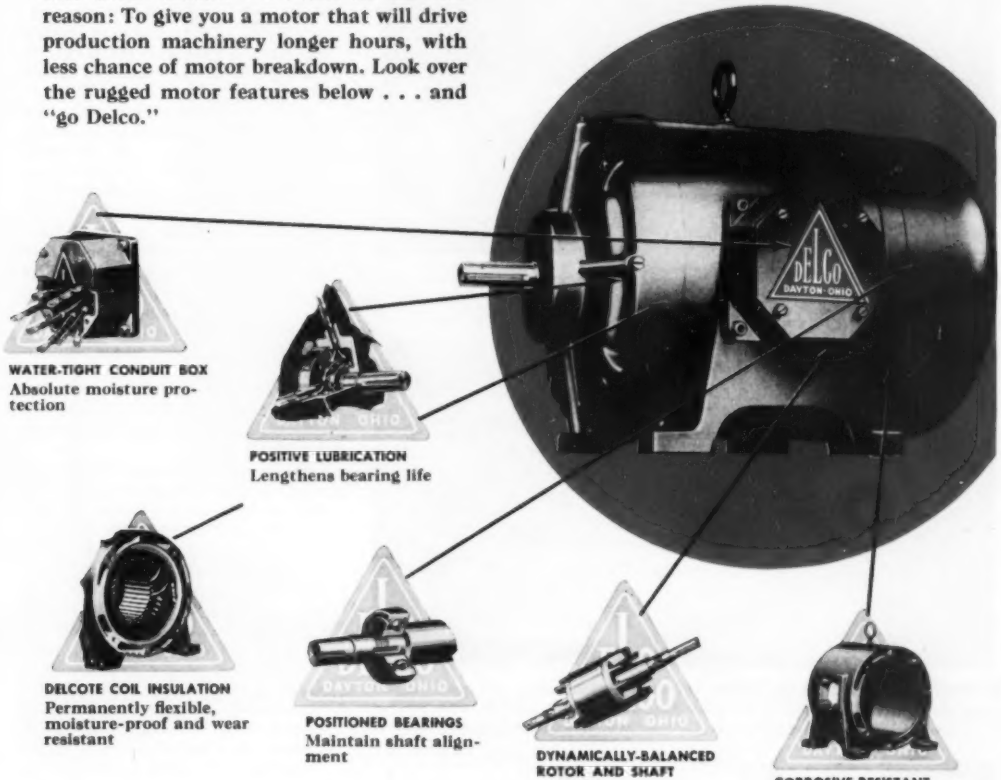

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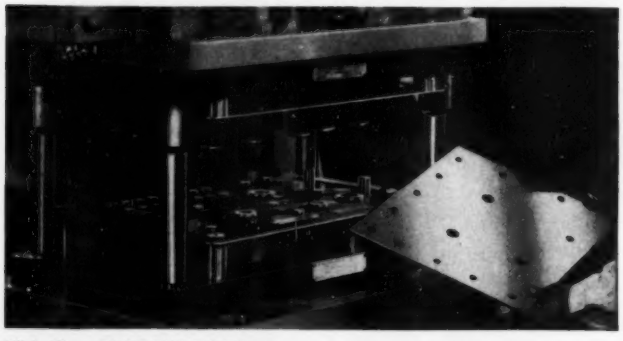

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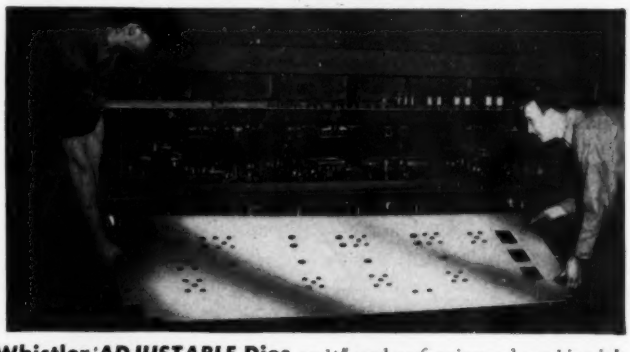

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PRESSWORKING OF METALS—*Revised and enlarged second edition. By C. W. Hinman, formerly chief of jig and fixture designing, Western Electric Co. 551 pages. Published by the McGraw-Hill Book Co, 330 West 42nd St., New York, N.Y. Price* $8.50.

MANY leading engineers in the tool, die and stamping industry regard Mr. Hinman's book as the leader in its field. They were speaking of the first edition brought out in 1941.

Hinman won acclaim for the first edition because he stressed principles in die engineering and operating principles of presses. That basic approach is retained in the revised and enlarged second edition.

The new edition is much more valuable than its predecessor for two reasons: 1. The author assembled a great mass of new material as an outgrowth of the rapid development of the press-working of metals from 1941 to 1950. 2. Based on his previous industrial experience and field requests since becoming an author, he was able to select the most pertinent information for inclusion in the new edition.

Selection and arrangement of new material was a task requiring a great deal of labor, plus experience. Hinman has done this effectively. There is every reason to believe, therefore, that his work will remain a classic and prove of even greater value to tool and die engineers, operating people and others connected with the stamping trade.

The second edition has 50% more explanation on how presses are designed to operate with different types of dies. This is a subject which has proved of especial interest to the stamping trade in the last year or so. The reason is easy to find. Application of stampings to all sorts of products is growing apace the uses for the various kinds of stamping dies and methods are expanding.

Progressive dies have become of more interest because of increased production quantities. This phase of die work is therefore treated with special attention to good drawings and photographs, plus helpful tables and formulas.

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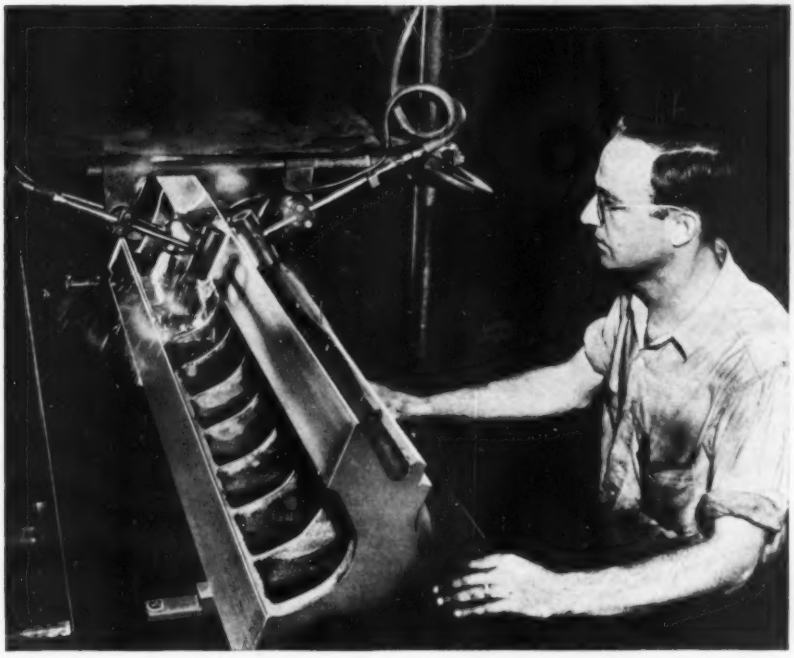

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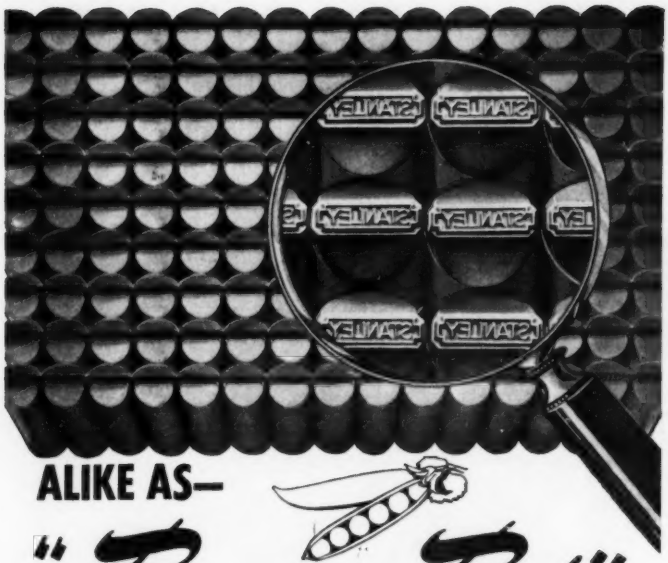

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In short, the book presents 600 press-tool designs, types of presses, feeds, attachments, etc., plus more reference tables, formulas and practical calculations. Hence, the experienced man can learn from perusing the book, the die engineer has at his hand a reference guide of proved principles and constructions, and the novice or student has a reliable text. As book prices go these days, Hinman's book is a bargain.

•

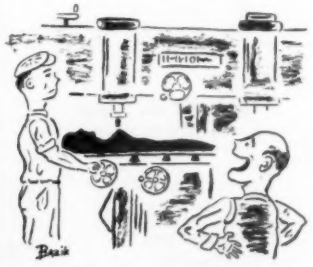
PREVENTIVE MAINTENANCE MANUAL—*Published by Professional Expediting Service, Box 224, West Hartford 7, Conn. 42 pages, 4¼ x 7.3 in., paper-bound. Price $2.*

This book, which is offset Vari-type, outlines only in a broad way methods of acomplishing the end result; it also calls attention to many items that easily could be overlooked by those starting a program. Included are sections on how to establish a program, cost of operation, scope, hints on maintenance, and sample forms.

•

PRODUCTION MANAGEMENT SURVEY—*By Ralph M. Barnes and J. Bryan Sullivan. Published by Bureau of Business and Economic Research, Southern Section, University of California, Los Angeles, Calif. 21 pages.*

This report presents data revealing the status of industrial engineering practice in 67 industrial firms within the greater Los Angeles area. Six pages are devoted to reproduction of clauses pertaining to time study, production standards, and wage incentives contained in union contracts of the companies surveyed.



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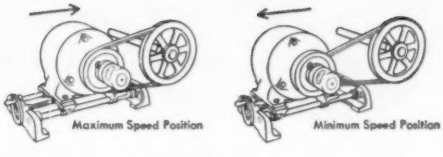

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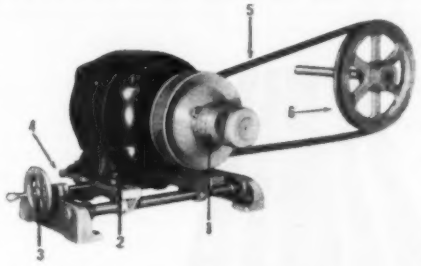

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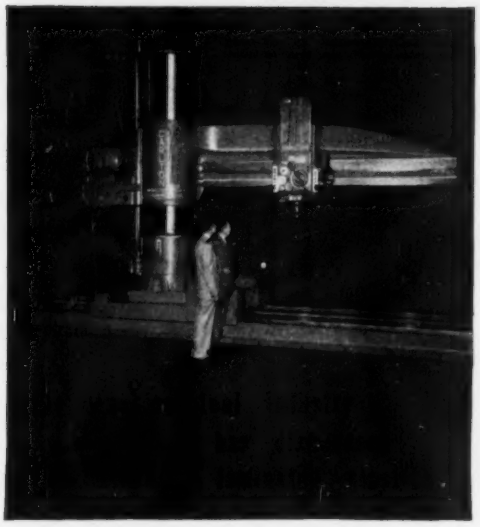

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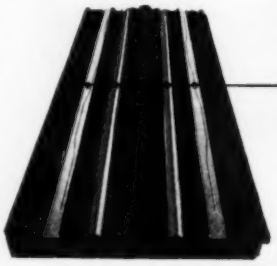
The Carlton Machine Tool Co., for example, used Formica in the new 41-ton 5-A Radial Drill shown above . . . because (1) it eliminates the scoring and cutting common on metal-to-metal bearings, (2) it reduces friction and wear and (3) insulates against heat and thereby prevents distortion and loss of accuracy.

The G. A. Gray Co., pioneer in the use of Formica for bearing surfaces, has for many years made this versatile material available in its world-famous planers and planer-type machine tools.



The Gray planer table *shown here has four Formica ways which will carry loads up to 180,000 pounds! Here's dramatic proof that Formica can carry heavy loads and give planer-type accuracy . . . for years.*

* Formica end-grain material is molded with laminations perpendicular to ing surface. This design permits bearing loads than cast iron and better!

Why don't you discover how neatly Formica can solve your bearing problem? You can get the benefit of Formica engineers' vast experience in this field . . . by mailing the coupon below.

Productive FORMICA *at Work in Industry*

THE FORMICA COMPANY, 4636 SPRING GROVE AVENUE, CINCINNATI 32, OHIO
Please send me complete information on Formica end-grain material for bearing surface applications.

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COMPANY _____

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H&G DIE HEADS

WITH INSERT CHASERS

FOR ALL MACHINES USED FOR CUTTING SCREW THREADS

The famous H & G Die Heads come in styles and sizes for all types of machines, including threading machines, chucking machines, drill presses, turret lathes, and automatic screw machines, such as Brown & Sharpe, Cleveland, Cone, Davenport, Economy, Foote-Burt, Greenlee, Gridley, Acme-Gridley, New Britain, New Britain-Gridley, Swiss, etc.

The small, inexpensive high-speed steel insert chasers are held by rugged carriers and cut threads straight and true to the close tolerances required.

The majority of expert production men prefer these die heads because of the ease with which insert chasers are resharpened and set, the low cost of insert chasers and the greater quantity of threads per grind and number of pieces threaded per chaser dollar.

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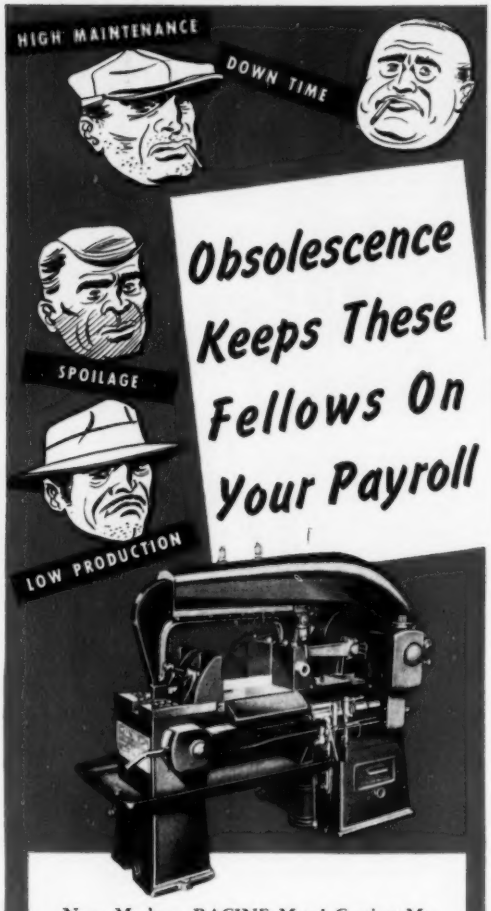

Obsolescence Keeps These Fellows On Your Payroll

New, Modern, RACINE Metal Cutting Machines step up your entire production. They save material — reduce cut-off time and lessen subsequent machining operation because they are so extremely accurate.

Savings in your metal cutting will help offset ever-mounting tax, labor and material cost. Late model RACINE Power Saws hit costs at the first stage in every metal working job — where the bar or billet is cut to size. All capacities — 6" x 6" to 20" x 20". Single purpose or fully automatic bar feed units.

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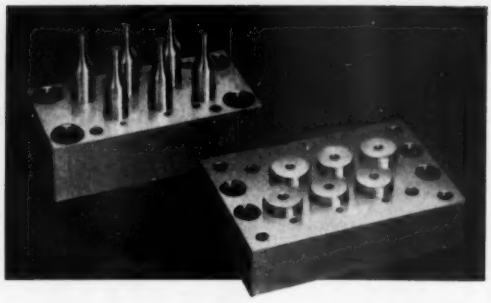

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***Faster* Die Assembly**

***Closer* Hole Spacing**

Here's a way to gain all the advantages of R-B interchangeable punches and dies plus additional savings in time and money on die construction. R-B special retainer plates, made to your specifications, eliminate mounting individual retainers—ball retainer locks are built into the plate—thus are ideal for piercing parts with holes too close to permit separate retainers.

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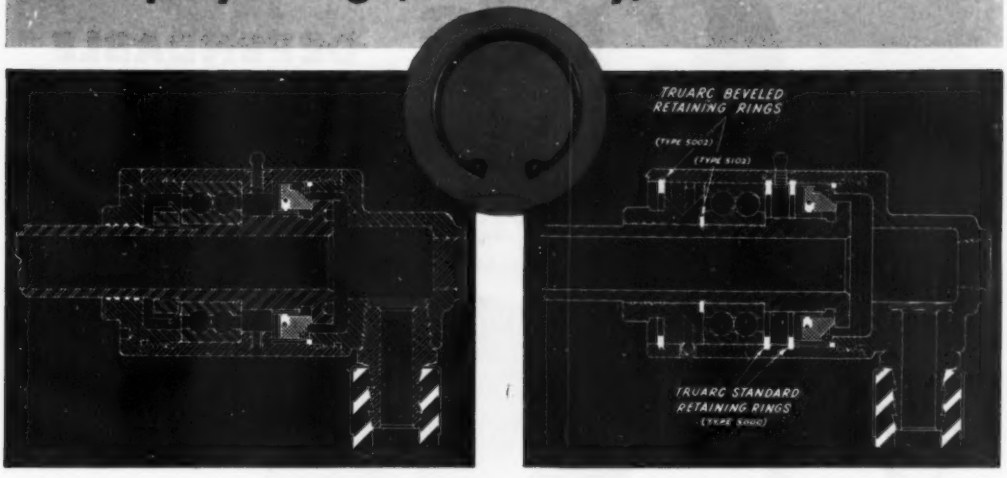

Conventional Way. This design died on the drawing boards, because the Deublin Company, Northbrook, Ill., found the simplified design, using Truarc Rings, superior and more economical.

Truarc Way. Truarc Beveled Retaining Ring holds cap in place, takes up end play, locks entire assembly. Second Beveled Ring positions ball bearing on rotor. 2 standard Truarc Rings position bearing and removable seal, eliminate shoulders, permit manufacture of housing from strong, non-porous, easily machined brass tubing. Unit can be serviced in minutes simply by removing 2 Truarc Rings.

HOW $2.41 WAS SAVED

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decreased wall thickness of housing	$.79
eliminated bearing lock nut and washer	.18
	.97
Machine operations eliminated	
Bore, undercut, and tap cap end of housing	.39
Locate cap on arbor, and chase threads	.28
Drill spanner wrench holes	.10
Cut thread on rotor for lock nut	.09
Mill slot in thread for tang on lock washer	.18
Drill spanner wrench holes in rotor	.10
	1.14
Assembly operations eliminated	
Install lock washer, tighten lock nut, bend lug	.20
Assemble cap into housing	.10
	.30
TOTAL SAVINGS	$2.41

THE Deublin Union—a rotating joint for steam, air, or water—is simple, rugged, easy to service. 4 Waldes Truarc Rings hold entire unit together, permit simplified design, cut unit cost $2.41.

Improve and simplify your own product design with Truarc Rings, and you too will cut costs. Wherever you use machined shoulders, nuts, bolts, snap rings, cotter pins, there's a Waldes Truarc Ring that does a better job of holding parts together.

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Courtesy—Errington Mechanical Laboratory, Inc.

Restrictions in the use of nickel alloys almost brought production of these gears to a halt. Instead, an increasing number of gears are being produced to meet defense requirements—and vital nickel is being conserved. The story contains an idea you, too, may find useful.

The gears, machined from alloy bar stock, form the gear train in a multiple drill head—a versatile, high speed production tool. Precision made to individual specifications, this drill head can drive a number of drills or taps simultaneously, each at its own spindle speed, with only a single work set-up.

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At Chicago Bridge & Iron Company, Salt Lake City, Utah, heavy structural shapes have to be bent accurately and in a hurry! The "Buffalo" No. 3 Horizontal Bending Roll shown above does the job—does it economically and does it well. But let R. S. Chamberlin, Shop Engineer, tell the story:

"Up to the present time," says Mr. Chamberlin, "the Buffalo No. 3 Horizontal Bending Roll has given us very little maintenance trouble. We use the machine for many operations. For example: rolling structural shapes, back-up bars, narrow plates, rails, etc., and by its use we have expedited our structural work considerably."

Chicago Bridge and Iron, with FOUR Buffalo Bending Rolls, is just one of hundreds of firms profiting from the use of these machines. Why not investigate?

YOURS ON REQUEST! If your operations call for bending light sections, write for Bulletin 3344-A, on "Buffalo" OA Aircraft Type Rolls. For heavy bending, specify Bulletin 352-B, left.

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DRILLING PUNCHING CUTTING SHEARING BENDING

Two answers to one big problem

Intelligent estimates indicate that materials handling still represents 35 per cent of the average metalworking plant's production costs. Here are two recent special reports from *American Machinist* which offer valuable answers to how these costs can be reduced . . . and quickly:

Slash Handling Costs by "Tooling" Your Shop Trucks . . . This eight-page report by Editor Miles Rowan reports on a variety of attachments available for increasing the efficiency and versatility of your shop industrial trucks, describes their use and how they will quickly pay for themselves out of savings. 15 cents a copy.

How Materials Handling Affects Plant Layout . . . Reprints of this widely acclaimed report are still available at 25 cents per copy. It's 16 pages are filled with the latest information on how production shops can best be planned for the most efficient use of modern materials handling equipment. Particular emphasis is given to the design of new buildings which can take maxmium advantage of efficient handling right from the start.

For your copies of these reports, write Reader Service Department at address below. And don't forget to read the materials handling advertising which appears regularly in *American Machinist's* pages. It keeps you up-to-date on the best and newest materials handling equipment now available from America's leading manufacturers of it.

American Machinist

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From the *American Machinist* Library of *Tips for Top Shop Men*

"QUEER DUCKS"—the men that don't fit the pattern—are also the men who don't think like the rest. They'll give you trouble, but they'll usually also give you ideas. Barnyard ducks conform readily to rules, but end up in a pot.

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When "Specs" Call for True, Round, Straight Holes in Parts Like These.....

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Vacuum pump body

Material = Malleable cast iron
Hole diameter = 1 1/8"
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Gage = Air gage
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A complete installation costs about $1,000.00 —and usually pays for itself in a few months' time. Sunnen Honing *may be the answer* to internal finishing problems in *your* plant, too. Mail the coupon for details.

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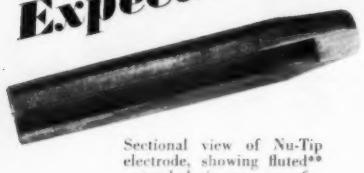
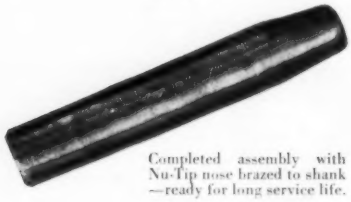


Sectional view of Nu-Tip electrode, showing fluted** water hole in new nose for superior cooling.

Mallory Nu-Tip* Spot Welding Electrode Conservation Program

Typical mushroomed and scarred electrode no longer suitable for production.

Reworked electrode shank with old nose removed and Nu-Tip nose ready for brazing.



Completed assembly with Nu-Tip nose brazed to shank —ready for long service life.

Saves Critical Copper ... Keeps Production Rolling

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Brazing is done with a special Mallory silver solder providing a bond of high melting point, high strength and low resistance.

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Nu-Tip noses have fluted water holes for more effective cooling.

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Nu-Tip electrodes closely approximate the performance of new Mallory electrodes. If you are faced with a low inventory of usable electrodes, write for technical details and prices.

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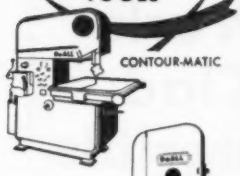
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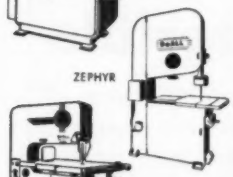
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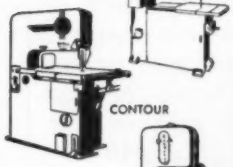
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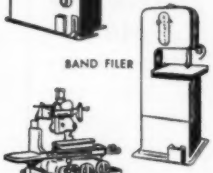
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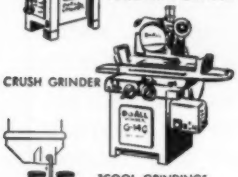
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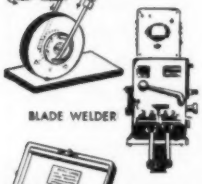
"COOL GRINDING" ATTACHMENT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G. N. Krouse, owner of Krouse Testing Machine Co., Columbus, Ohio, inspecting 5" micrometer scales after "Cool Grinding" on DoALL Model G-1 Surface Grinder. These scales with .001" taper from end to end are held to accuracy of .00002" (20 millionths of an inch). Their micrometers and scales are used to measure plating thickness.

DoALL COOL GRINDING

(Coolant-through-the-Wheel)

U.S. Patent No. 2470350

This patented technique used with a DoALL Surface Grinder opens an entirely new grinding era—faster, more accurate, better finishes.

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4. Finer finish—no cracking, warping or "skin softness".
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Des Plaines, Ill., U.S.A.

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  no finishing operation necessary
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  no starting hole necessary
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  7 GAUGE IN STAINLESS STEEL
- **DELIVERY FROM STOCK**
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MAKERS OF BETTER MACHINE TOOLS . . . SINCE 1867

The Tru-Edge Contour Shear is made by Baker Bros., Inc., under license from Industrial Devices Corp., Detroit, Mich.

ANSWERS HUNDREDS OF QUESTIONS ON MACHINE-SHOP PRACTICE! . . .

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Clad materials are not difficult to work, require only care and routine experience. "How to Work Clad Materials," an *American Machinist* Special Editorial Report, contains all the latest facts on how to work clad materials most efficiently and profitably. This 16-page report, complete with informative drawings, diagrams, and photographs, is still available for only 25¢ a copy. Write to Reader Service Department:

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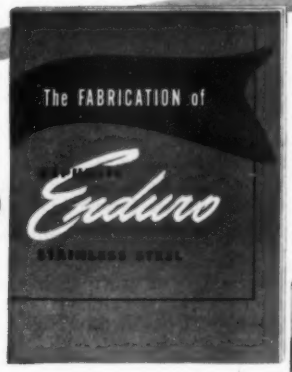

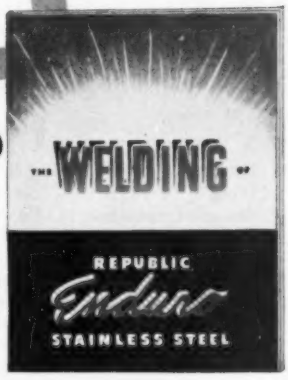

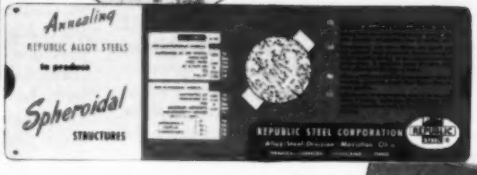

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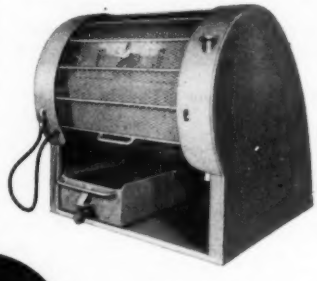
A Statement about Modern Tumbling

De-burring and finishing metal parts by tumbling with chips and compounds in specially designed machinery is a relatively new process. This technique was initially developed just prior to World War II, and was designed primarily for finishing parts preparatory to plating. The effects of chips and compounds on different metal parts were studied through a trial and error effort. Surprisingly good finishes were obtained which could be duplicated uniformly.

Successful grinding and finishing were performed on steel, brass, aluminum, stainless and nickel steels—on castings, forgings, stampings, and machined parts. Uniformity on quantity lots was attained from severe grinding to fine finishing. Likewise, a more uniform surface finish was obtained and dimensions were held to close tolerances. Besides producing a superior finish on most work, the process indicated tremendous savings in direct labor.

Tumbling Aids World War II Production

It was at about this same time that manufacturers became occupied with defense, and, shortly later, war production. Tumbling was a natural answer to the extreme demands put upon producers to step-up de-burring operations. The faster tempo of increased manufacturing could not be satisfied by old fashioned, hand applied methods. Tumbling with chips and compounds broke this bottleneck, because it could do the job not only faster with less labor, but could do it as accurately or more so than by hand. Standardized procedures were established, based on the experience of using certain types and sizes of chips, and various compound preparations on different kinds of metal parts. Savings were made over hand methods by as much as 80% on work for aircraft, electronic, naval, munition, and military vehicle production.



Grav-i-Flo Offers Improved Tumbling

Grav-i-Flo now offers the first big advancement in modern tumbling with new equipment and materials that increase direct labor savings over previous tumbling methods. New Super-Brite chips and specially designed machinery cut both ferrous and non-ferrous metals 25% to 40% faster, handle 30% more work load in the same floor space, eliminate subsequent operations as ball burnishing. New compounds change chip surface from finishing to cutting in minutes, and eliminate need to transfer parts from machine cylinder.

Investigate Grav-i-Flo Now!

By employing the Grav-i-Flo process, manufacturers will achieve even greater savings in de-burring parts for defense items than in the former preparedness program. Those producers handling defense contracts should investigate the possibilities of Grav-i-Flo for their work. The Grav-i-Flo Corporation will process samples free to show how your parts can be deburred at substantial savings! Send samples direct to The Grav-i-Flo Corporation.

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DoALL
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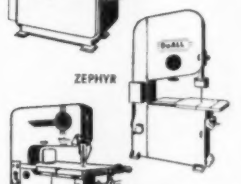
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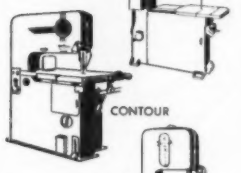
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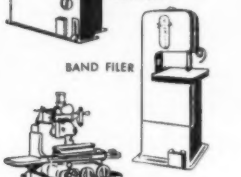
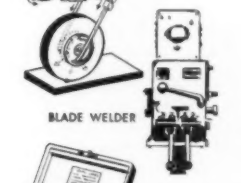

BAND FILER

TOOLROOM GRINDER

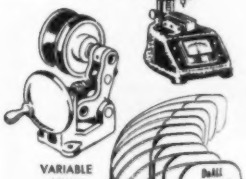
CRUSH GRINDER

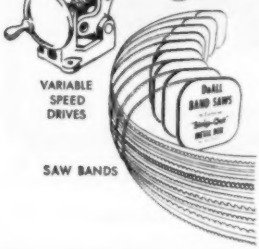
"COOL GRINDING" ATTACHMENT


BLADE WELDER

GAGE BLOCKS

GAGE ACCESSORIES


VARIABLE SPEED DRIVES



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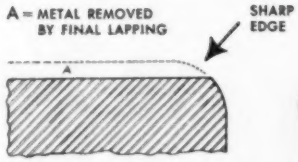
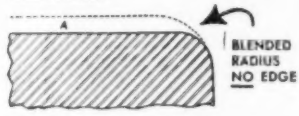
IS THE NEW EXCLUSIVE FEATURE OF

DoALL GAGE BLOCKS



CONVENTIONAL GAGE BLOCKS

Ordinary usage raises burr or "wire edge" at sharp microscopic edges of standard gage blocks—which makes them unusable.



DoALL "BURR-PROOF" GAGE BLOCKS

The Secret of "Re-Rounded" Edges

Now, without added cost, you can have the new DoALL "BURR-PROOF" gage blocks that last twice as long as other standard blocks. Think of the great savings in replacement costs, fewer rejects and better quality products! Developed and used exclusively by DoALL, burr-proofing is the latest major achievement in gage block history. It "re-rounds" the edges of the blocks to prevent formation of microscopic burrs caused by ordinary usage. Burred edges are a major reason for discarding gage blocks—even a burr only 2 millionth inch can make a block unsuitable.

Although gage makers round the edges of the blocks to prevent burrs, the purpose of rounding is defeated by final lapping, which produces unwanted sharp edges. These become burred by the slight shocks and jars of normal handling. Mechanical operations to re-round the edges after lapping are avoided as they invariably cause distortion. Therefore the sharp edges left have been tolerated as a necessary evil—until the new DoALL process that "re-rounds" edges *without* distortion.

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All DoALL gage blocks are burr-proofed. They are the key units of the integrated inspection equipment that DoALL manufactures for industry.

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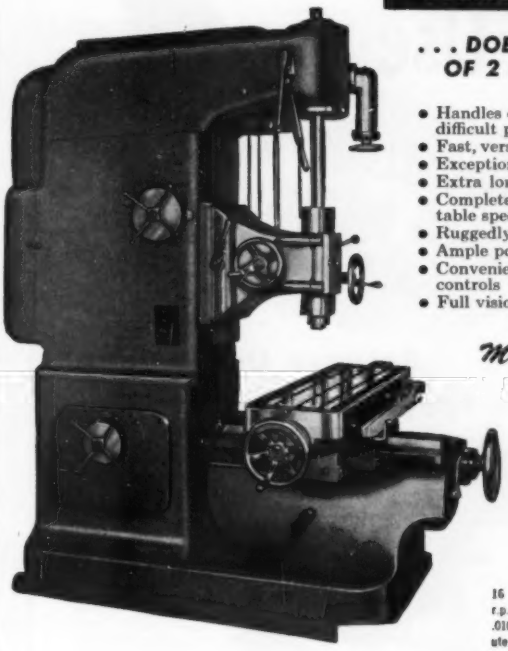

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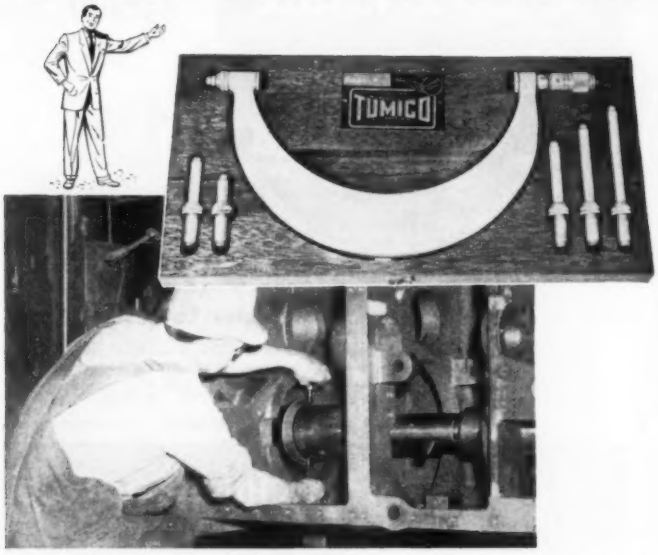

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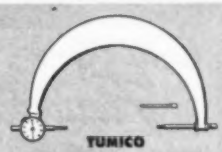

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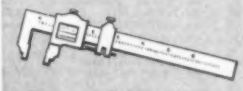

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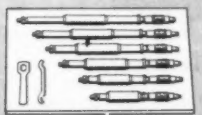

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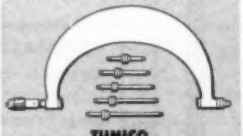

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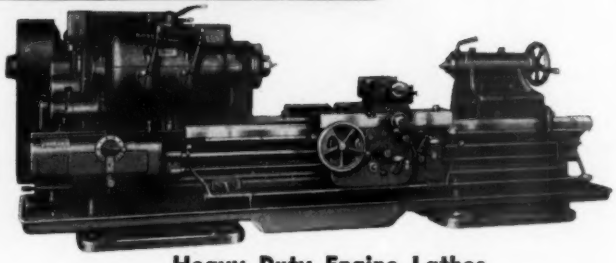

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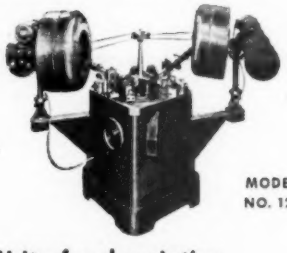

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Fit the method and the tooling to the worth of the job. A short run usually justifies only simple tooling; the longer the run, the better the tooling. The cheap job or low-cost material usually means ingenuity rather than tool engineering. The wide-tolerance job permits hogging cuts and rough work; the close-tolerance job demands primary consideration of finish and shape, secondary consideration of speed and holding method. Distortion and surface effect then become important.

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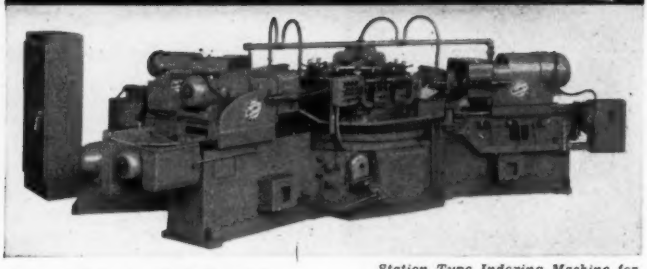


Station Type Indexing Machine for drilling and reaming king pin holes.

On a Davis & Thompson 5 Station Machine

This type MDT FIVE STATION INDEXING DRILLER has five fixtures mounted on the index table. Each of these fixtures holds 2 RH and 2 LH automobile front suspension support arms. Four ROTO-MATIC Power Heads, each having four spindles, perform the following operations:

1. Drill 53/64" dia.—Half way through.
2. Drill .823" dia. — Balance of way through.
3. End Cut Ream .8547/.8550" — Full length of hole.
4. Finish Ream .8635/.8637"—Full length of hole.
5. Load and Unload.

Two RH and two LH pieces are completed at the end of each cycle. Cycling is automatic, and, operator loads and unloads during machine cycle.

4 New Davis & Thompson Mechanical Power Heads

Included in the design of this machine are the new ROTO-MATIC Mechanical Electrical Power Heads operated through screw feed. An important safety feature of these units is the patented overload release clutches on the feed. Because of the simplicity of their design the units require a minimum of servicing.

Free Data

Will be furnished on request.

DAVIS and Roto-Matic THOMPSON

Davis & Thompson Company

6411 W. BURNHAM ST., MILWAUKEE 14, WISCONSIN

From the *American Machinist* Library of Tips for Top Shop Men

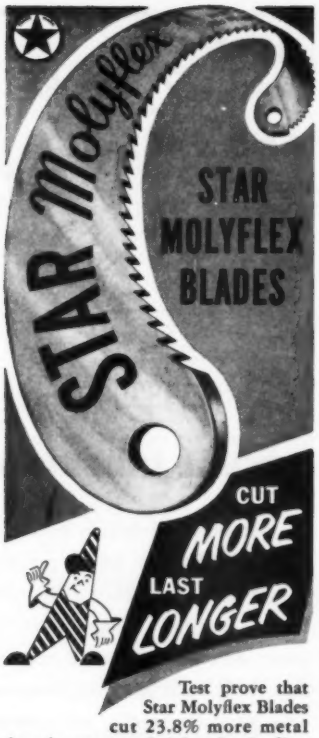
ONE old-time shop manager, taking over from a tough and unapproachable predecessor, changed the atmosphere completely by saying: "When you have a problem, come in and see me. There's no frost on my doorknob!"

THERE'S always a way. Remember the college that got a bequest of several hundred thousand dollars for a new girls' dormitory — which the will stipulated must be surrounded by a 20-ft wall. A smart trustee suggested the bequest be accepted and the dorm be built—with the wall in a 20-ft trench.

INFORMATION WANTED . . .

The Advertising Research Foundation's first readership study of a metalworking magazine reveals that *American Machinist* readers want and seek information on the new machinery, equipment, materials, and other products that can help them do a better production job.

The New Shop Equipment, Materials, and Parts Department . . . devoted entirely to illustrations and descriptions of new products available . . . received higher readership and attention (72 per cent) than any other editorial item surveyed in the March 6, 1950 issue . . . strong evidence that *American Machinist* is a good place to do business with America's biggest industry.



Test prove that Star Molyflex Blades cut 23.8% more metal than the average of eight other leading high speed blades tested! That means they're extra tough—and that they cut clean and easy, too. Molyflex high speed steel blades are completely shatter-proof—completely unbreakable in a frame. They're available in a complete range of sizes and pitches. They're made right to handle your roughest, toughest metal-cutting jobs.

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These extruded soapstone crayons can be used on hot, cold, damp or grimy metals. Markings withstand pickling—will not affect enamel applications. A complete range of sizes and shapes.

Ask your distributor for free copies of the STAR Wall Chart and STAR Metal-Cutting Booklet. They'll show you how to get maximum cutting results from hand, band and power blades.

The STAR Line is *complete*—there's a STAR Blade that's right for *every* cutting job a hack saw or band saw can handle.

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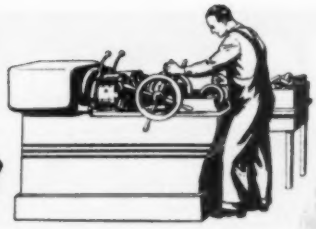
TIPS ON TAPPING AND THREADING TROUBLES



Page A-6

DATA

OILS FOR TAPPING AND THREADING

OILS WITH ACTIVE SULPHUR REQUIRED

Tapping and threading are difficult machining operations due primarily to limited chip room and the difficulty of maintaining sufficient lubrication at points of contact between threading tool and workpiece. Cutting oils having high sulphur activity are usually required and recommended for difficult threading and tapping work. Stuart's THREDKUT and related products, due to their high effective sulphur content, have been outstanding for this class of work. Active or effective sulphur in an oil functions as an anti-weld agent preventing pick-up of metal particles on the tool which results in scuffing and poor finishes.

RULE OF THUMB

Here is a good rule of thumb to remember when sulphurized cutting oils are being used: When you observe excessive wear on the front clearance of cutting tools, DECREASE the amount of active sulphur in the oil by diluting with paraffin oil or other low cost blending oil. If poor finish is encountered due to welding or metal pick-up on the tool edge, INCREASE the active sulphur, or if Stuart's THREDKUT is being used, apply it straight.

RESULTS

Operation: Threading male pipe union sections on large automatics using single point tools.
Material: Type 310 stainless steel.

Oil:	Previous Oil	Stuart's THREDKUT 9961
Tool Life:	136 pcs. per tool grind	310 pcs. per tool grind
Part Finish:	Fair	Excellent
Cutting Fluid Costs on Machine:	$0.47 per gallon	$0.44 per gallon

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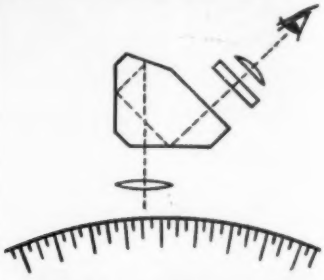

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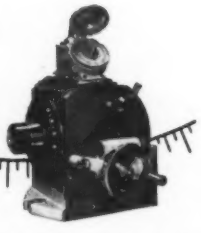
. . . permits reproducible accuracy within .0005 inches on the periphery of a 12 inch circle. The setting is entirely independent of gears with their inherent inaccuracies. You read degrees, minutes and seconds directly; no tabular references are required. There are no index plates, no setting holes to locate.

Increase both accuracy and speed of indexing on your machine tools. Investigate OPL Dividing Heads.

WRITE FOR OPL CATALOG



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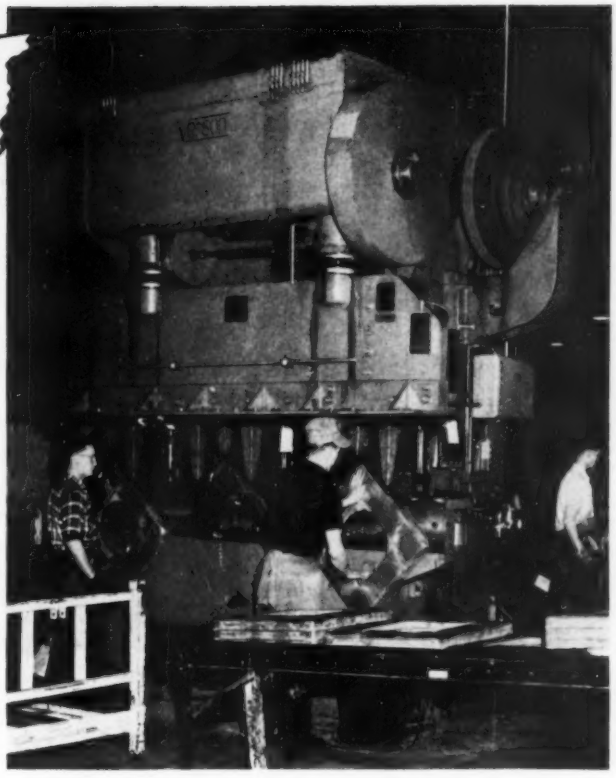
return flanges 200 washer covers per hour



In modern metal forming procedures, the press brake has become a "Jack-of-all-trades" and a very good one at that. Take the job illustrated above—tops of Maytag automatic washers are return flanged on a Verson Major Press Brake with Verson Tooling—and on a production basis. Yet, as well as the press brake performs on the more complicated jobs, it is equally adaptable to simple bending with runs of just a few pieces.

If you have a forming, bending, coping, notching or punching job, it will pay to consider a Verson Press Brake Tool-Up. There is a Verson Press Brake for every need from 48″ of 16 ga. steel up to long lengths of heavy plate. Both mechanical or hydraulic types are available. Verson Press Brake Tooling can be furnished for virtually every shape from a simple 90° angle to the most intricate multi-operation formed sections.

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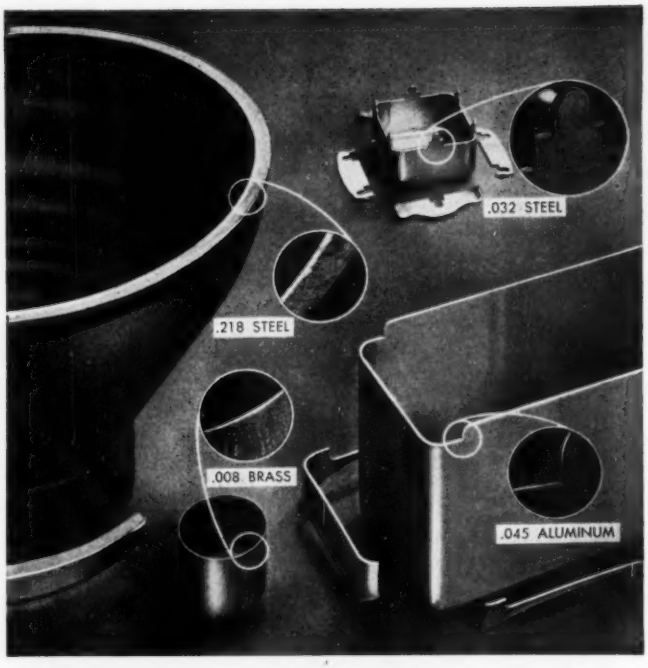

Could your shell be in this picture?

One of the amazing things about the Brehm Trimming Die is that stock thickness doesn't make much difference. Take a look at the shells shown above. They range from .008 brass to .218 steel. If you make a shell within that range, or maybe beyond it depending on material, you should be able to increase production and decrease cost with a Brehm Trimming Die.

Materials? Almost anything . . . gold, silver, stainless or mild steel, copper, brass, zinc, aluminum, fiber, rubber or plastics.

Thicknesses? In actual manufacture, from .008 brass to .218 steel, a range likely to cover most of your normal requirements.

Quantities? As high as 1200 per hour, where the small shell and scrap were blown from the die. Electric iron covers at 625 per hour, and large refrigerator doors at 264 per hour!

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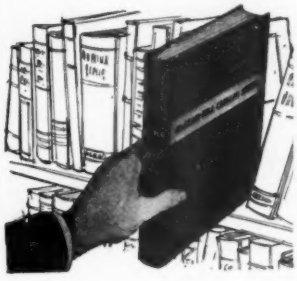

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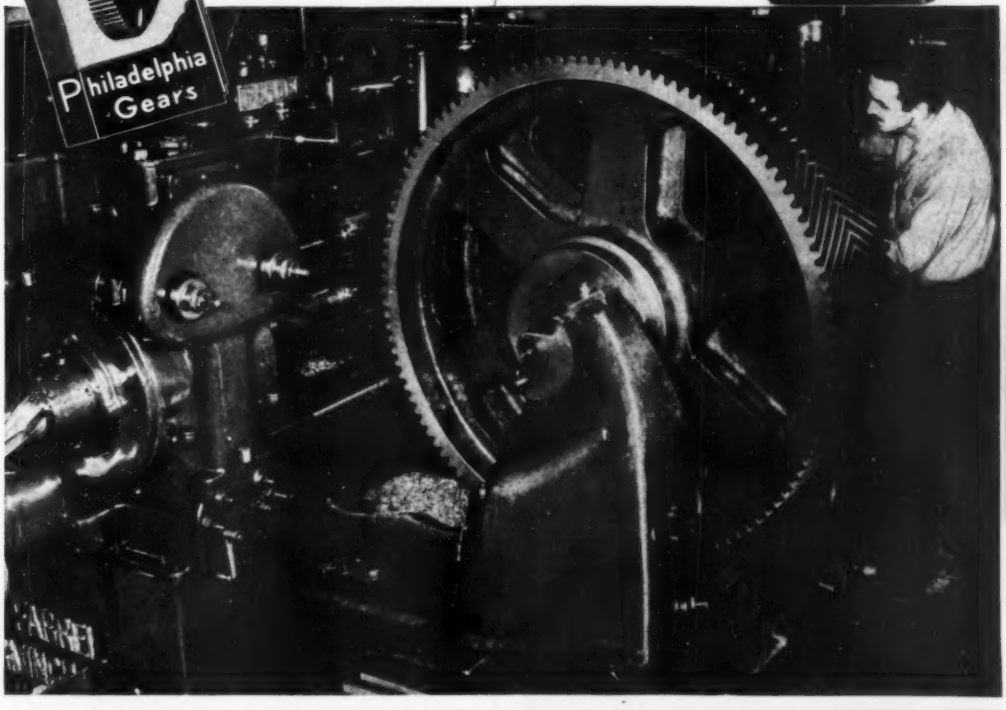

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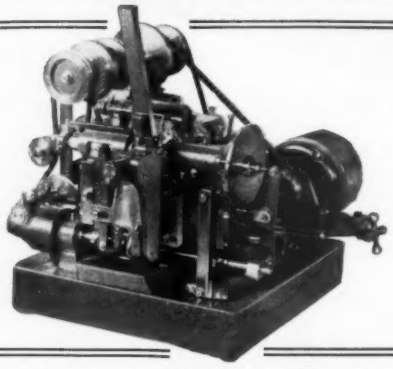

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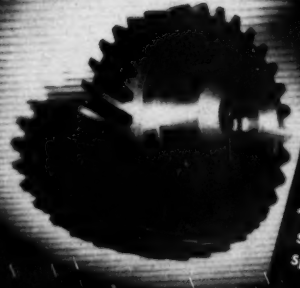

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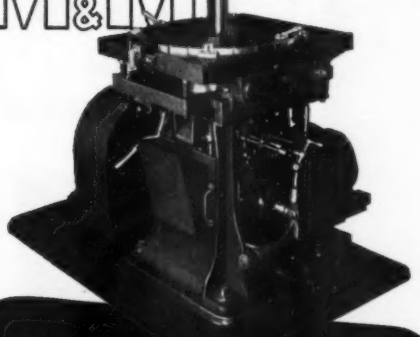

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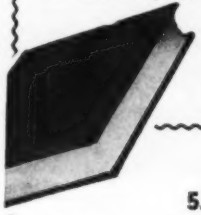

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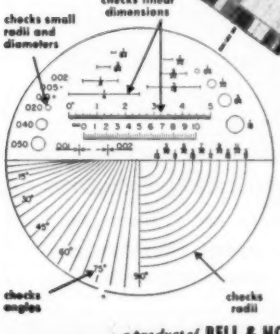

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From the *American Machinist* Library of *Tips for Top Shop Men*

DON'T flaunt your greater income or privileges before your subordinates. No matter how much they like you, their resentment and envy will do you more harm than the flaunting does your ego good.

REMEMBER that human problems need careful study just as do engineering problems. Man is multi-motivated and one prescription won't cure all his ills.

BE suspicious of any figures you hear, and of most of those you see. If they don't correspond immediately to your previous experience, check 'em before you quote or use 'em. The urge to make numbers bigger, or smaller than anything previously reported is overpowering to some people; don't be victimized.

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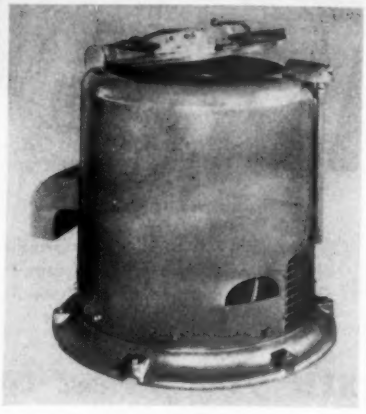

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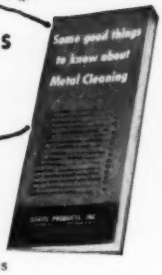

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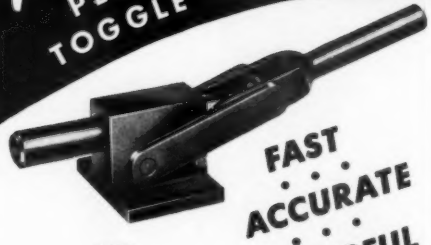

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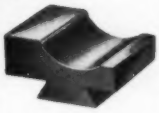

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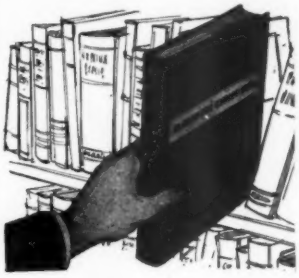

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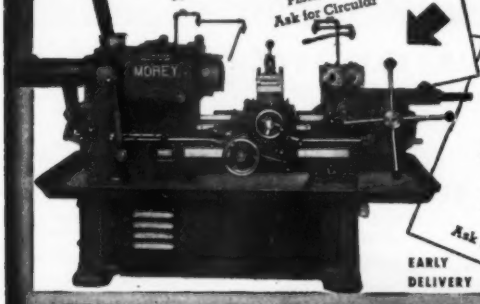

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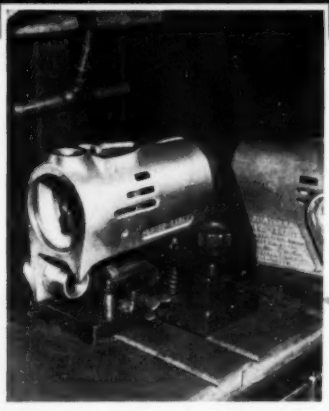

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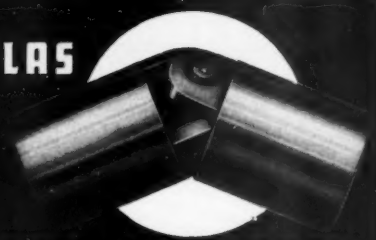

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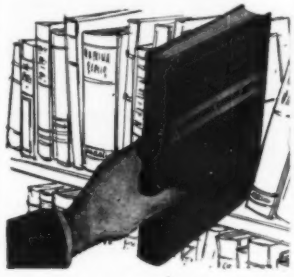

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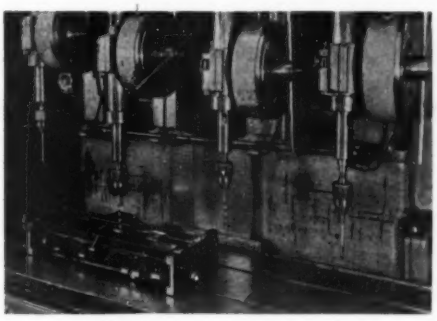

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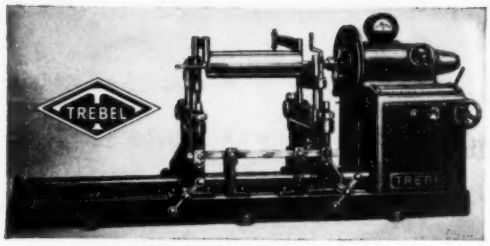

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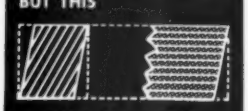

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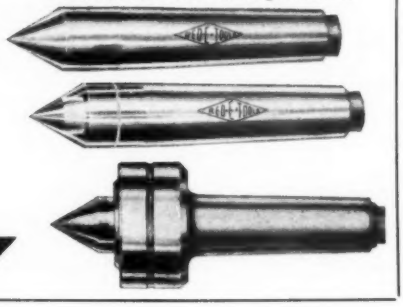

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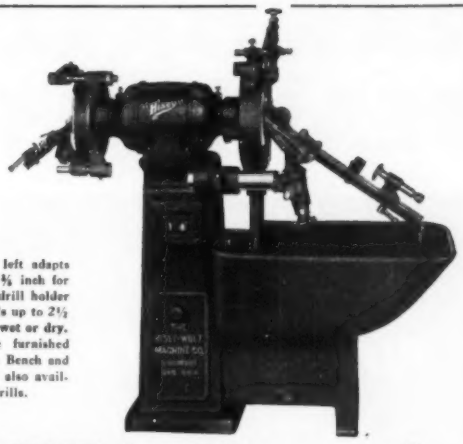

Small drill holder on left adapts drills from No. 60 to ½ inch for dry grinding. • Large drill holder on right end is for drills up to 2½ inches and can be used wet or dry. Machine can also be furnished without pan and pump. Bench and pedestal type machines also available for smaller size drills.

Drills MUST be Sharp and-- Correctly Ground

Drills that are sharp and correctly ground will (1) drill to exact size (2) drill faster, (3) drill more holes per grind, (4) drill the same with each lip, (5) require less power to drill, (6) reduce breakage, (7) cost less to regrind and increase the life of drill by removing less metal when grinding.

"HISEY" Drill Grinders are designed to grind drills correctly and quickly with inexperienced operators.

ASK FOR CATALOG 71-AH

Other "HISEY" Products: Bench and Pedestal Grinders and Buffers, Snagging Grinders, Lathe Type Grinders, Wet Tool Grinders and Disc Grinders.

Hisey THE HISEY-WOLF MACHINE CO.
CINCINNATI 8, OHIO
Division of The Cincinnati Electrical Tool Co.

From the *American Machinist* Library of *Tips for Top Shop Men*

SABOTAGE is a greater potential danger for most plants than bombing. Have you taken any precautions to guard against it?

MORALE isn't built in a crisis; it's built beforehand. The crisis only tests it.

THERE'S an old saying that "If you want to be big, you've got to look big." Nobody likes a fourflusher or a fop, but everybody has been trained from childhood to expect a leader to look like one. Company policy can't earn respect on the major things either, if it is small on the minor things. Don't make your company look small.

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Randall bearings last longer—run quieter because they are specially engineered and precision made for specific applications. Randall's are made from the very finest of materials and employ an exclusive double lubricating feature that assures longer lasting, trouble-free service. Randall bearings, proven dependable by millions of applications, have been accepted as standard equipment by approximately 85% of the leading manufacturers in the air moving industry. Randall bearings are available in a variety of sizes and styles for shaft sizes ranging from ½" to 3-15/16". Write today for additional information on Randall bearings or send your requirements. Randall's engineering department is at your service.

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PILLOW BLOCKS
SHEET LUBRICATOR
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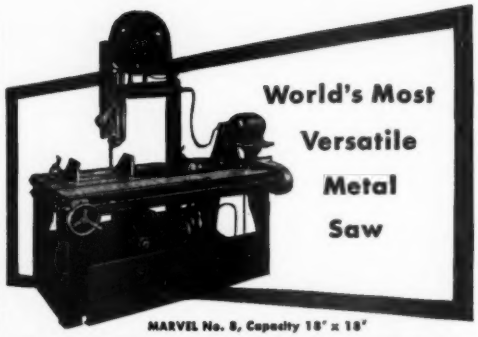

MARVEL No. 8, Capacity 18" x 18"

There is no other sawing machine like it. The work remains stationary. The blade is guided with a 90° twist and power fed vertically through the work. The saw blade and column can be instantly swung and clamped at any angle to 45° either right or left from vertical for miter cutting.

The number 8 MARVEL saw will handle the smallest, as well as the largest work up to 18" x 18". It will cut-off, trim, miter, notch, and split all bar stock, pipe, structural sections, moulding, tubing, or irregular shapes.

Write for our catalog, containing valuable information, enabling you to select a metal saw best suited to your work.

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Better Machines—Better Blades

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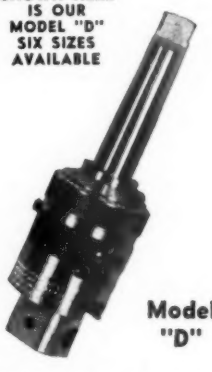
SHOWN HERE IS OUR MODEL "D" SIX SIZES AVAILABLE

REDESIGNED, MANY NEW FEATURES

ALL HAVE POWER FEED FOR FACING!



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Aluminum shipments today are at a rate seven times the prewar average. Aluminum is the most widely used nonferrous metal, and present demand for it keeps its producers busy round the clock . . . supplying enough to meet aluminum's almost 4,000 current commercial uses.

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Reprints are available at 25¢ each. Write to Reader Service Department:

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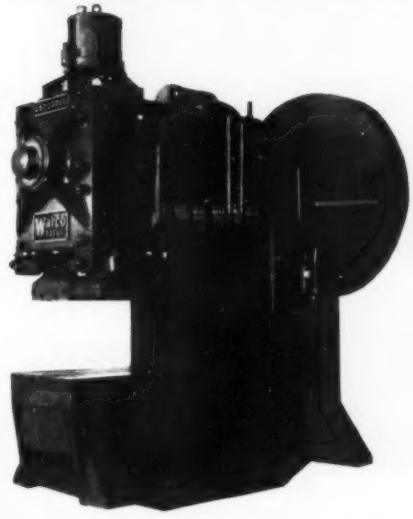
WELDED STEEL CONSTRUCTION FOR GREATER DESIGN FLEXIBILITY



Because Warco designs and builds in components of welded steel and casting, Warco Presses and Press Equipment have a versatility unsurpassed in the industry. For example, the Eccentric Shaft Deep Throat Gap Press here was designed to take the place of a conventional punching machine to be used for punching holes in plate and structural members. This Press eliminates the positive type clutch. It minimizes operator fatigue and increases production by an instantaneous air clutch which includes inching feature for setting dies. If you want design flexibility in your machines — contact your nearest Warco representative.

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THE FEDERAL MACHINE & WELDER CO.
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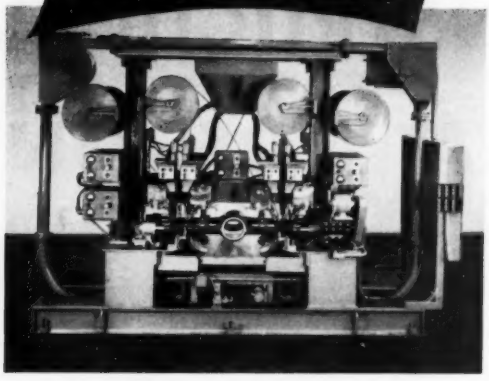
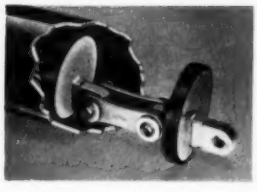


Hapman
TUBULAR CONVEYORS



to improve equipment you buy or build?

As an example, look at this Expert Automatic Submerged Arc Welder. While six welds are made simultaneously, the Hapman rubber-flighted, sealed-pin Chain Conveyor picks up unused flux at bottom and returns it to hopper at top for re-use.

Other flux-return methods were tried. But for low operating and maintenance costs, the Hapman Conveyor proved its advantages.

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• Think twice when indicating your carbide grade specification . . . don't limit your carbide toolmaker to a brand|or grade of carbide which is unavailable or not *best* suited for your job.

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FULL DETAILS WILL SOLVE YOUR BORING PROBLEMS—SEND FOR THEM TODAY!

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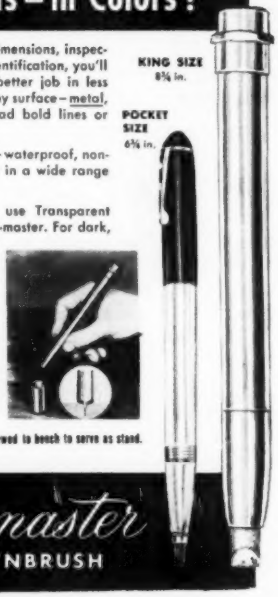
Whether it be marking for dimensions, inspection, stocking or assembly identification, you'll find the Flo-master does a better job in less time. Its felt tip glides over any surface – metal, plastic, wood, etc. with broad bold lines or fine lines.

Flo-master semi-opaque inks – waterproof, non-smudging, fast-drying – come in a wide range of colors.

For light colored surfaces, use Transparent Inks with "POCKET SIZE" Flo-master. For dark, hard-to-mark surfaces, use Semi-opaque Inks with the "KING SIZE" Flo-master.

Adopt Flo-master Color Marking and see the difference!

Ask your supplier or write to Cushman & Denison Mfg. Co., 153 West 23rd Street, New York 11, N. Y.



Cap of "King Size" may be screwed to bench to serve as stand.

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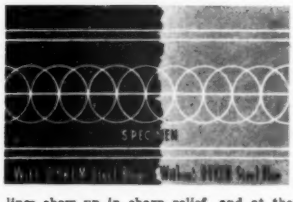
FOUNTNBRUSH

DYKEM STEEL BLUE

STOPS LOSSES making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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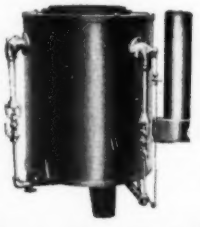

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McGRAW-HILL publications

F-25

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Before Sharpening Averaged only 600 holes per tap when tapping 10-32, 5/16" deep through hole (Class #3 fit) in die cast aluminum. Standard 2-flute Commercial Grd. spiral pointed tap used.

After Sharpening on Blake Equipment Tap reground with 18° hook in flute and spiral point increases tapped holes *per grind* to 12,000—an increase of *2000% per grind.* Average six grinds per tap before it is discarded as too small or too short in thread length. Total holes per tap: 72,000.

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To get dollar-for-dollar value from your taps, you *must* sharpen them just as you do other cutting tools. The Blake Flute Grinder and the Blake Chamfer Grinder provide you with fast, accurate, and economical means for grinding straight flutes, spiral points, and the chamfered ends of your taps — a sure means of reducing your tap bill. Investigate today.

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EXPANSION REAMERS — FORM TOOLS — CENTERS — MASONRY DRILLS
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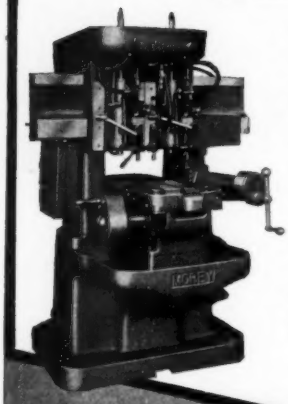
For PRECISION Plus PRODUCTION

MOREY VERTICAL PROFILER AND MILLING MACHINE



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Cross head is balanced on vibration-free cross rail . . . Clearance between spindle and table easily increased or decreased . . . Spindles mounted on precision bearings . . . Ball bearings throughout . . . Slides ride on scraped ways and are adjustable against future wear.

Ample provision for lubrication . . . Simple adjustment takes up backlash . . . No chatter marks on work . . .

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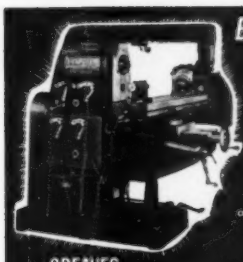

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PUT SMALL JOBS ON THIS
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and save your larger machines for heavier work.

YOU'LL BE SURPRISED!
at the extremely low first cost and the vitally important jobs that this little precision machine can do. It will pay you to get our accuracy information on this machine which has 6" x 10" table movement and 7" x 17½" table size.

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Installation of this Syntron SF-01 Screening Feeder reduced shut-down time at the end of each shift allowed for each centerless grinder operator to clean coolant tank.

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For the efficient removal of sludge from coolant liquids used on centerless grinders, automatic screw machines or any type machine requiring a coolant.

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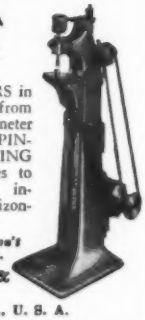

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This view shows a machine table being reground to "new-tool" accuracy

This view shows checking for spindle alignment during the course of reassembly

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This view shows a small battery of machine tools in the process of being reassembled *(All reconditioned machines are stripped to their bare frames—rebuilt from the bottom up).*

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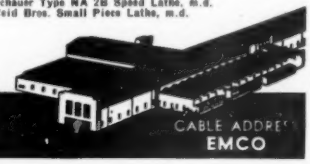

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MILLING Machine, Horiz. #4 LeBlond Univ. Hvy.

MILLING Machine, Horiz. #1½ B & Sharpe Univ.

MILLING Machine, Horiz. #2 Kempsmith Univ.

MILLING Machine, Horiz. #2 B & Sharpe Univ.

MILLING Machine, Horiz. #3 B & Sharpe Univ.

MILLING Machine, Duplex. Cochrane-Bly #14 Univ.

MILLING Machine, Duplex, Van Norman #2.

MILLING Machine, Cincin. #4—36 Plain Hydmatic.

MILLING Machine, Prod. #1—18 Cinci. Hor. Auto.

MILLING Machine, Prod. #8—8 Cinci. Vertical.

MILLING Machine, Prod. #8—8 Cinci. Auto. Horiz.

MILLING Machine, Production, #12 B&S 18".

MILLING Machine, Prod. #12 B&S 24" Late Type.

MILLING Machine, Horiz. K&T #2B Dble. Overarm. 220/440.

MILLING Machine, Horiz. Nichol- son Millers.

MILLING Machine, Cincinnati Vertical #3 H.S. Dial Type, W/Rotary Table.

MILLING Machine, U. S. #MMI-8 Cam Controlled Automatic Horizontal, #40 taper, Late Type. 220/440 motors. TWO.

THREAD MILLER, Pratt & Whitney #1165. 6x14 cap. 220/440 volts.

THREAD MILLER, Hanson Whitney 4"x9" Univ. Semi-Automatic.

THREAD MILLER, Lees Bradner #40A Automatic Chucking. 220/440 v.

THREAD MILLER, Pan-O-Mill #3 Planetary Form & Thread Semi-Automatic Milling Machine, #40 Spdl. Timken Bearing. THY-MO-TROL Control Unit. 5 h.p.

PIPE THREADER, Williams #3, 1½" to 6".

BOLT THREADER, Hill-Acme #1½-C Sgle. Hd.

TAPPER & THREADER, W & S #11R Dual Radial. Motor and Tooling.

TAPPER, W & S #1 Sgle. Spdle.

POWER PRESS, Bliss #164 Open Back S.S.S.A. 65 tons, 4" Stroke.

POWER PRESS, Bliss #3A S.S. Dble. Crank S.A. Grd. 45 tons, 4" stroke, 36" between uprights.

POWER PRESS — Bliss - Consolidated #163 - B Straight Side Dble. Crank Single Action, 45 tons, 9" stroke, Bed area—24" x 41", 15 h.p. 220 motor.

PRESS, Federal #2 O.B.I. Grd. 2" Stro.

PRESS, Federal #2 O.B.I. 2" Stro.

PRESS, Federal #3 O.B.I. Grd. 4" Stro.

PRESS Federal #4 O.B.I. Grd. 3" Stro.

CUT-OFF SAW, Yates-American #M-90. 220/440.

SAW, Band, Tannewitz #GH-36" High Speed.

SHAPER, Vert., Pratt Whitney #B—6" Motor Dr.

SHAPER—Columbia 32" S.G. Crank.

SHAPER, Morton 36" Draw-Cut, 4-Speed.

LATHE, Turret, W & S #6 Grd. Hd. Ram Type. 5 h.p. 440 v.

LATHE, Turret, Cinci-Acme #2 Univ. Grd. Hd. w/Duo-Control.

LATHE, Turret, W & S #1-A Univ. Grd. Hd. for chucking & bar feed, collets & chuck. 2½" Cap. 7½ h.p. 220 volts.

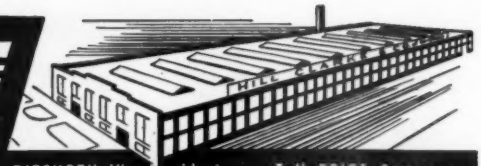
SHEAR, Squaring, Wysong & Miles #372-A 6'x 14 ga. All gauges & 220/440 motor.

SHEAR, Quickwork #A-1 Rotary 60" Throat. 18 ga.

WELDER, Federal #712 AT Motor Driven Toggle Action Projection. New in 1936. 200 KVA. 18" throat. Stroke—1" to 3". With controls.

WELDER, Federal #624B Hvy. Duty Grd. Type 75 KVA 1½" Stroke. 17" throat. Motor driven.

HILL-CLARKE MACHINERY COMPANY



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DRILLS

1 Spdl—28" Sw—No. 2 LMS L.G. Hyd.
2 Spdl—24" Sw—No. 2 Aveymatic
3 Spdl—15" Sw—No. 2—MA 6—Avey
4 Spdl—24" Sw—No. 3 Avey
6 Spdl—14" Sw—No. 2 LMS L.G. Hyd.

GEAR MACHINES

No. 61-A Fellows Gear Shaper (1942)
No. 7 Fellows Gear Shaper (1942)
No. 72 Fellows Gear Shaper
11" Gleason Bevel Gear Generator
12" Gleason Bevel Gear Generator
No. 13 Brown & Sharpe Spur & Bevel
No. 1 Whiton Auto. Gear Cutter
No. 6 Gleason Bevel Gear Tester (1942)
No. 2—36" Schuchardt & Schutte

BORING MACHINES

Rockford—3½" Bar
34" King Vert. Bor. Mill

GRINDERS

6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x36" Norton Type C (1943)
10"x72" Landis Type C Hydraulic
Hill-Clarke Norton Type Motor Driven Grinders
10"x36" centers
10"x50" centers
10"x72" centers
10"x96" centers
14"x36" centers
14"x72" centers
14"x120" centers
16"-40" gap x 120" centers
18"x96" centers
18"-30" Gap x 96" centers
20"x96" centers
23"x36" centers
24"-32" Gap x 144" centers
No. 25-A Heald Surface Grinder
No. 104 Rivett Internal Gdr. (1943)
No. 5 Bryant Internal Grd.
No. 72-A-5 Heald Internal (1942)
No. 72-A-5 Heald Extended Bridge Internal
No. 16-18 Bryant Internal Grd.
No. 16-28 Bryant Internal Grd.
No. 24-26 Bryant Internal Grd.
No. 81 Heald Centerless Internal

LATHES

Model R-14 Seneca Falls Lo-Swing

MILLING MACHINES

No. 3 Cincinnati H.P. Universal
No. 3B Milwaukee Plain
No. 4 Cincinnati H.P. Plain
No. 5 Cincinnati H.P. Plain
No. 0B Cincinnati Plain
No. 0B Cincinnati Vert.
No. 2½-B Milwaukee Vert
No. 2—18" Sundstrand-Electromil (1942)
No. 2—24" Sundstrand-Electromil (1942)
No. 4—48 Cincinnati Hyd.—2 Vert. Hds.
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 45-48 Cin. Hyd. Tracer (1941)
4"x9" Hanson Whitney Thrd. Mill
6"x36" Lees-Bradner—Model LT (1943)
6"x80" Pratt & Whitney Thrd. Mill
6"x132" Pratt & Whitney Thrd. Mill
6"x180" Pratt & Whitney Thrd. Mill
10"x48" Hanson-Whitney Thread (1942)
10"x60" Pratt & Whitney Thrd. Mill
12"x54" H.T. Lees-Bradner Thread Miller (1943)
48"x24"x12' Ingersoll Slab Miller, 4 Hds.

MISCELLANEOUS

15" Dill Slotter
18" Dill Slotter
38" Morton Draw-Cut Shaper (1945)
18" Newton Slotter
10"x10" Rassmussen Saw, Stock Fd.
No. 0 Bakewell Tapper
Baush Radial Tapper
No. 307 Barnes Hone
Model H-7 Micromatic Vert,. Hone, 1 Spdl.
Model 200 Micromatic Horiz. Hone, 1 Spdl.
Model H-2 Micromatic Horiz. Hone, 2 Spdl.
14' Niles-Bement-Pond Roll
Am. Chip Wringers (New) 3.3 to 12.6 bushel capacity

PLANERS

36"x36"x12' Cincinnati, 2 hds.
36"x36"x12' Gray, 2 Hds.
42"x42"x10' Cincinnati 2 hds.
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

C-3

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651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

LATE MODEL MACHINE TOOLS . .

AUTOMATICS

20"x25" Fay Automatic. 1942.
No. 3-8 Sees ⅞" Cap. 1942.

DRILLS

4' 11" Canedy Otto Radial.
No. 2 LMS Leland Gifford Hyd. 1942.

GEAR EQUIPMENT

No. 64&A3 & 81A Fellows Gear Shaper. 1944.
No. 0 Gleason Revacycle. 1940.
No. 6 Gleason Gear Tester. 1942.
8" Red Ring Internal Shaver. 1942.
15" Red Ring Lapper. 1942.
Red Ring Universal Tester. 1942.

GRINDERS, CYLINDRICAL

14"x168" Norton Plain Type C. 1942.
14"x48" Norton Pl. Type C. Hyd. 1941.
14"x36" Landis Univ. Type C. Hyd. 1942.
12"x36" Norton Universal. 1941.
6"x18" No. 10 Brown & Sharpe Pl. Hyd. 1943.

GRINDERS—INTERNAL

No. 24-36 Bryant Hyd. 1943.
No. 172 Heald Hyd. Gap. 1940.
No. 81 Heald Plain Hyd. 1940.
No. 73 Heald Airplane Cyl. 1942.
72A3 Heald Plain Hyd. 1942.
No. 50 Heald Hyd. 1943.

GRINDERS—THREAD

No. 35L Excello Precision. 1943.
No. TG-615 Jones & Lamson. 1942.

GUN BARREL MACHINES

No. 410 Barnes Deep Hole Drill. 1943.
No. ½-8x50 P&W Reamer. 1942.
No. ½-8x30 P&W Reamer. 1942.
No. ½-8x50 P&W Rifler. 1942.

LATHES—ENGINE

36"x396" American G.H.
20"x240" LeBlond. 1941.

LATHES—PRODUCTION

No. 3 FU Foster "Fastermatic". 1942.
14"x42" Monarch "Magnamatic". 1941.
8"x108" Lo-Swing Semi-Auto. 1942.
No. R-14 Lo-Swing. 1941.

LATHES, TURRET

No. 4A Warner & Swasey. 1942.
No. 1A Warner & Swasey. 1938.
No. 5.0 Acme Universal. 1942.
No. 1H-6 Libby Universal. 1942.
No. 3 Bardons & Oliver. 1940.

MILLS, PRODUCTION

No. 34-36 Cincinnati Hydro. 1942.
No. 5-48 Cincinnati Hydromatic. 1942.
No. 118 Cincinnati. 1942.
No. 1-14 Kent Owens Hyd. 1942.
No. 0B Cincinnati Plain. 1943.
U.S. Multi-Millers. 1942.

MILLS, THREAD

6"x6" LT Lees Bradner. 1942.

MISCELLANEOUS

48"x⅛" Niles Plate Straightener.
No. 616 Cleveland Rigidturner. 1942.

PRESSES

58 Ton Niagara, S.S. Late.

SHAPERS

24" Rockford H.D. Hyd. Latest.
20" Cincinnati Plain. Late.
6" Pratt & Whitney Vertical. 1942.

WELDERS

100 KVA Taylor-Winfield Seam. .943.

Write for latest stock list

INDIANAPOLIS *Machinery & Supply Co.*
1961 S. Meridian St. . . Indianapolis, Indiana

MUST MOVE PROMPTLY FROM LOCAL CUSTOMER'S PLANT

BEMENT MILES 18" SLOTTER with 3" dia. spindle. M.D.

KING BORING MILL 42" 2 swivel heads. 38" table. 4 chuck jaws. M.D.

GOULD & EBERHARD 40" Gear Cutter, M.D.

BROWN & SHARPE #5—48" Gear Cutter, M.D.

KEMPSMITH #4 Maxi-Miller, M.D.

BINSEE MACHINERY COMPANY HORIZONTAL BORING MILL. Table 30"x64". Quantity of boring bars.

LODGE & SHIPLEY 30"x72" c to c Geared Head, Quick Change Lathe, M.D.

CINCINNATI 60"x60"x12' Planer. 4 heads. 1 extra side head on massive floor stand for open side work. M.D.

CINCINNATI BICKFORD 7' RADIAL DRILL 17" column. M.D.

CINCINNATI BICKFORD 6' RADIAL DRILL 19" column. M.D.

LEBLOND 28"x14' QUICK CHANGE LATHE. Cone or M.D.

AMERICAN 20"x16' QUICK CHANGE GEAR LATHE. M.D. Old, but good.

BARNES HEAVY DUTY 26", 4-SPINDLE DRILL. 1 spindle for tapping. M.D. #5 M.T.

GRINDERS—CYLINDRICAL. B & S #11, 12"x 32". Plain Grinder. Table swivels. Motorized.

LANDIS 10"x36" Plain, M.D. Also Planer type Grinder 16"x36".

GRAY 32"x32"x10' PLANER. 2 swivelling heads. M.D.

"BEMENT" 26" STROKE TRAVERSING HEAD SHAPER. 48" travel to ram. 2 tables.

THE OSBORNE & SEXTON MACHINERY CO.
P. O. Box 88 Columbus 16, Ohio

Latest Types — Guaranteed Machine Tools 1941-1950 Models

BORING MACHINES—PRECISION

BARNES: No. 412 Horizontal, 60" travel

BROACHING MACHINES

CINCINNATI: 2-36 Vertical Broach

CAM MILLERS & GRINDERS

SUNDSTRAND: #96 Double Head Miller for cylindrical cams
VAN NORMAN: Contour Miller 10CT
MOREY: 12M 2-Spindle Profiler
HEALD: 172 Sizematic Grinder for cylindrical cams

DRILLING MACHINES

AVEY: No. 2 Deep Hole Drill, 18" stroke—hydraulic
LELAND-GIFFORD: No. 2LMS Deep Hole
BARNES: 201¼ 2-spindle on 3-spindle base
BAKER: 30HO 2-spindle inverted, hydraulic, deep hole
BAKER: 217 Upright Heavy Duty
FOSDICK: No. 4BM Upright, High Speed
PROVIDENCE ENG.: FV-6 Sensitive 6-Spindle, ¾" capacity
PRATT & WHITNEY: ½B x 50 Deep Hole Reamer
ALLEN: #2 High Speed
ARCHDALE: Radial, all sizes (New)
WALKER-TURNER: D950, ½" capacity, bench type (new)

ENGRAVING MACHINES

DECKEL type—3 dimensional, (New)
GORTON: 3U & 3Z, 2 dimensional
GORTON: 3B, 3 dimensional

GEAR CUTTING MACHINES

BARBER-COLMAN: No. 3 Hobber
BROWN & SHARPE: No. 6 Gear Cutter 72" diameter
CLEVELAND: No. 140 Hobber—1 spindle
FELLOWS: 61A, 64A, 6Z2, 7 and 72 Shapers
FELLOWS: 61, 35" capacity
FELLOWS: Straight Line Generator
GLEASON: #12 Rough & Finish Generator
GLEASON: 3" Straight Bevel Gear
GOULD & EBERHARDT: 36BM Cutter
HAMILTON: No. 1 Hobber, 6" diameter
SYKES: Gear Shaper 14" external, 20" internal
SYKES: Rack Cutting Machine 24"

GEAR FINISHERS & TESTERS

FELLOWS: 8LS1 and 13 LS1 Gear Lappers. External & Internal. Spur and Helical
FELLOWS: No. 12-C Spacing Tester
GLEASON: No. 13 Universal Tester
GLEASON: No. 4 and No. 6 Bevel Gear Testers, Hand and Power Operated
GLEASON: 3" Bevel Gear Tester
ILLINOIS: 514 Center distance & Concentricity Checker.
ILLINOIS: 804 Bevel Gear Hand Rolling Fixture.

GEAR & SPLINE GRINDERS

PRATT & WHITNEY: 10" single and double wheel
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines, also Internal
GLEASON: No. 17 Spiral, Zerol and Hypoid

GRINDERS—CYLINDRICAL

BROWN & SHARPE: No. 10 and No. 23 Plain
CINCINNATI: 6"x18" Hydraulic
CINCINNATI: 10"x36" Hydraulic
LANDIS: 18"x18" "C" Plain Hydraulic
LANDIS: 18"x32" Type "D" Crankpin, Hydraulic
VAN NORMAN: #666 Crankshaft Regrinder
NORTON: 6"x18" & 10"x18"
NORTON: 10"x18" 45 angle wheel head

GRINDERS—GEAR & SPLINE

PRATT & WHITNEY: 10" single and double wheel
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Splines, also Internal
GLEASON: No. 17 Spiral, Zerol & Hypoid

GRINDERS—INTERNAL

BRYANT: No. 5Y Internal
BRYANT: 112 Universal, Hydraulic
BRYANT: 16C16 Hole, Hydraulic
HEALD: 70A Plain
HEALD: 72A3, 72A5 Plain and Univ.
HEALD: 72A3 Sizematic Centerless
HEALD: 72A5 T-bed, Universal
HEALD: 172 Sizematic for cyl. cams
RIVETT: No. 104 Tool Room

GRINDERS—RADIUS

VAN NORMAN: No. 73, 639, 649
VAN NORMAN: No. 3½ Universal

GRINDERS—SURFACE

ARTER: A-1—6" Rotary
ARTER: A-3—12" Rotary
THOMPSON: 8"x12"x18" Type B
HEALD: 8" Rotary
HEALD: No. 22 Rotary—12" Chuck
GARDNER: 120A Opposed Head Disc

GRINDERS—THREAD

EXCELLO: No. 31 and No. 33 External
JONES & LAMSON: TG-1245 External, 12"x 45"

HONING MACHINES

BARNES: No. 304H Vertical
BARNES: 307 Vertical
MICROMATIC: H-510 Double End Horizontal
MICROMATIC: H-2 Single End Horizontal

LAPPING MACHINES

FELLOWS: 8LS1 and 13LS1 Gear Lappers
NORTON: No. 26 Hyprolaps
NORTON: No. 2F x 40" Diameter
SCHRANER: Model A External Cylindrical Lapper—6 heads.

LATHES—PRODUCTION

LIPE-ROLLWAY: 15"x30" Carbomatic
LODGE & SHIPLEY: No. 3A Duomatic
MICHIGAN: #1708 and 1712 Relieving
BLOUNT: HS polishing

LATHES—TURRET

BULLARD: 24", 36" Vertical
WEBSTER & BENNETT: Vertical Turret Lathes, 36" and 48" diameter
GISHOLT: #2L Saddle Type, Extended bed
HERBERT: Turret Lathes, all sizes (New)

MILLING MACHINES

CINCINNATI: 2-spindle Vertical Hydrotel with two rotary tables
CINCINNATI: No. 2M Vertical, Rotary table with power feed.
CINCINNATI: 0-8 Vertical
CINCINNATI: No. 4 Vertical
REED-PRENTICE: #5 Vertical 16"x60" table
SUNDSTRAND: 96 Rigidmil-Duplex (for milling cam tracks in propeller hubs or similar)
SUNDSTRAND: Nos. 0 and 00 Rigidmil.
MOREY: 12M 2-spindle Profiler
TAYLOR-FENN: M-80 Duplex Spline
TAYLOR-FENN: Vertical 6"x21" table
RICE-BARTON: Duplex Spline
VAN NORMAN: Contour Miller 10CT

SAWS & CUT-OFF MACHINES

MOTCH & MERRYWEATHER: No. 3 Circular Saw
TANNEWITZ: GH-36 Band Saw
RUSSELL: 9½" cut-off Saw with Auto. Stock Feed
CAMPBELL: No. 425 Cutalator Abrasive Cut-Off
WILLIAMS: 10" Pipe & Tube Cut-Off

THREAD MILLERS & TAPPERS

HALL PLANETARY: D Thread
LEES-BRADNER: LT 6"x36" Thread
LEES-BRADNER: 40A Thread Miller
MOREY: 12"x60" Thread Miller
MURCHEY: No. 23 Tapper, Horiz.
NATCO: Vert. Tapper 16 spindle
PRODUCTO: Hand Tapper

TOOL SHARPENERS

OLIVER: 2A Face Mill Grinder
OLIVER: 510 Drill Sharpener
OLIVER: 10" Tool Bit-Template
FELLOWS: Flat Top Helical Gear Cutter
RANSOM: 2-Wheel Grinder 3 HP
RUSSELL: 40" Saw Sharpener (New)
WALKER-TURNER: Bench Grinder ½ HP

MISCELLANEOUS

BAR POINTER & CHAMFER: Kent 3¼"
BAND SAW: Tannewitz, GH-36"
CUT-OFF: Campbell, Abrasive 425 Cutalator
CUT-OFF: Pipe & Tube, 10" Williams
DIE SINKER: Reed Prentice No. 5, 18"x60" Table
DISC GRINDER: Gardner No. 6
GRINDER: Walker Turner ½ HP Bench Type
LATHES: Blount Polishing 12"x48"
MOLDING: Jelt Rollover, Osborn No. 602
PRESS: Screw, Gen. Elec. 3 ton
RACK CUTTING MACHINE: Sykes 24"
RIVETER: Gen. Engr. 24" throat
TEST STAND: Denison 918-AM Hydraulic

TRIPLEX MACHINE TOOL CORP.

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PRESSES

300 ton Clearing Crankless, New 1942, 12" stroke, air cushion, Model F-1300-42.

180 ton Cleveland, New 1942, 18" stroke, Model #14-S.

Abrasive Cutoff, #213 Campbell, 7½ H.P., late.
Bending Roll, 8' x ½" Newbold, pinch, all steel, 1940.
Boring Mill, #32 Lucas 4" bar, table type.
Boring Mill, #0 Giddings & Lewis, 3", horiz.
Boring Mill, 72" Betts, vertical, 2 hds.
Boring Mill, 60 Gisholt, vertical, 2 hds.
Boring Mill, 44" Bullard Maxi-Mill, Vert. PRT, M.D.
Drill, 4 spindle, #2 KH Allen, ½" chucks, late.
Drill, 3 spindle, #2MS Leland Gifford, Mtr. Spdles.
Drill, Radial, 6' N-B-P "Rightline" M. on arm.
Gear Hobber, #36H Gould & Eberhardt univ.
Gear Lapper, Type 7LS Fellows, 1942.
Grinder, #212 Besly Horiz. Opposed Disc, late.
Grinder, Surface, #34 Abrasive Vert., '41.
Grinder, #5 Bryant, internal, late.
Lapper, #10-U Norton, vert., 1941.
Lathe, Duomatic, #3A Lodge & Shipley, 51" c.c., 1942.
Lathe, 54" x 20' Johnson, taper, M.D.
Lathe, 24" x 10' American, taper, grd. hd.
Lathe, 24" x 9' c.c. Reed-Prentice, grd. hd.
Lathe, 16" x 8' American, taper, M. in base.

For: Quality and Integrity!!

Get the best! **Good machinery, properly reconditioned and fully guaranteed. Here are a few representative items from stock.**

Lathe, Automatic, 12" x 21" Fay, 1940.
Lathe, Automatic, 12" x 24" Lipe-Carbo.
Lathe, 68" x 24' Niles, grd. hd., M.D.
Lathe, 36" x 30' Putnam, grd. hd., M.D.
Lathe, Gap, 19"/38" x 10' c.c. LeBlond, Timken.
Lathe, 16" x 6' South Bend, late
Miller, Prod., #000 Brown & Sharpe, 1942.
Miller, Vertical, #14 Cochrane Bly, slot. attach.
Planer, 36" x 36" x 12' Cincinnati, 2 hds., M.D.
Planer, 42" x 42" x 16' Gray, 3 hds., M.D.
Press, #6G Federal, 65 ton, OBI, 1951.
Turret Lathe, #2G Morey, bar, collets, 1942.
Turret Lathe, #2 Bardon & Oliver, 1943.
Welder, 50 KVA Acme air-press, spot, timer, late.

[WANTED Yes, we want good machine tools in any quantity. Call or write us today. **]**

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LATE TYPE MACHINE TOOLS

MAJORITY NEW SINCE 1940-1945 — FULLY GUARANTEED

BORING MILLS

#5-25—3" bar Defiance Table Type Horizontal
#31 Lucas—3" spindle Table Type Horizontal
#DB102 Excello Double End Six Spindle

GEAR MACHINES

#12—12" Gleason Two Tool Saraight Bevel Rougher
#36BM — 3 spindle Gould & Eberhardt Bevel Rougher — 1941
#48H Gould & Eberhardt Universal Hobber

GRINDERS—CYLINDRICAL

10"x18" LANDIS TYPE C HYDRAULIC—1940
10"x18" NORTON TYPE C HYDRAULIC—1944—reciprocating attach.
6"x18" Norton Type C—Reciprocating & Shoulder Attachments—1941
18"x120" Norton Plain

GRINDERS—INTERNAL

#73 Heald—1943
#72A5 Heald Plain—bridge—1942

GRINDERS—SURFACE

#300 Hanchett Hydraulic Vertical Spindle
#16 Blanchard High Power Vertical Spindle

GRINDER—THREAD

Model TG 615 Jones & Lamson Automatic (several) 1941

GRINDER—MISC.

#87 Wickman High Precision Profile Grinder—1942

HEADERS

#250 F MANCILLE DSSD—1944
#2 Manville DSSD (2)
#11 Waterbury Farrell DSDD
#00 Waterbury Farrell DSDD
#2C Manville—SSSD Ball (2)
#3C Manville SSSD Ball
#118C Manville SSSD Ball

LATHES

8"x84" Seneca Falls Lo-Swing (2)—1941
[illegible]-1/2" Seneca Falls Lo-Swing
26"x33" Swift Geared Head—1941
#10 Sundstrand Automatic Stub
#1 Lodge & Shipley Duomatic

MILLERS

#34-36 Cincinnati Plain Hydromatic (2) 1942
#5-48 Cincinnati Plain Hydromatic
#08 Cincinnati Horizontal (2) 1941
#08 Cincinnati—Vertical (several) 1941
#4 K & T Vertical
54"x18" Ingersoll Slab Miller

PLANERS

120"x96"x28' Cincinnati Heavy Duty Box Table

PRESSES

[illegible] HPM Vertical Hydraulic—1946
#8K Cleveland Knuckle Joint—1942

SCREW MACHINES

1⅞" Cone 8-spindle
⅞" 6-spindle Conomatic—1942—(2)
#6RPL 8 Acme Gridley 8-spindle Automatic—1940

TURRET LATHES

#4 Gisholt Universal Geared Head
#4A Warner & Swasey Universal
#3A Warner & Swasey Universal
#1A Warner & Swasey Universal
#H-5 Libby Heavy Duty Geared Head 1941

MISCELLANEOUS

#3 LeBlond Rifling Machine—1941
Webster Tallmadge Single Spindle Gun Barrel Borer—1942
#420 W. F. & J. Barnes Two-Spindle Deep Hole Drilling & Boring—1942
1½" Sutton Bar Straightening Machine
Inman Paper Box Machines

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Box 3006A, Bridgeport 5, Conn.—Tel: FAirfield 9-3393—Cables—Lucastools

Robbins & Myers Electric Hoists & Motors. All sizes in stock
Roll-forming machines and Roller Dies
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Brakes, Shears, Rolls, Sheet metal Equipment
Welders, Sciaky, 125, 150 KVA, complete

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12'x¼" DREIS & KRUMP. AC MOTOR DRIVE.

WEST PENN MACHINERY COMPANY
1210 House Bldg. Pittsburgh, Pa.

ANGLE ROLLS, 2"x2"x¼" H. & W., '42
BOLT THREADER, 1½" Williams Reliance
BORING MILLS, 100" & 60" Cinci., 2 Hds., P.R.T.
BORING MILLS, 3½" & 4" bar Landis Floor (3)
BORING MILL, 60" Colburn Vert., 2 Hds., PRT
BORE-HONE, Barnes, 10 stroke, 6" bore, '42
BRASS LATHE, 21" Acme, Late, Hardened Ways
RADIAL, 5'12" col. Amer. Trip. Purp., M-on-arm
RADIAL, 5'14" col. Amer. Trip. Purp. AC, M.D.
DRILL, 28" Colburn No. 6, 3" capty. 15 H.P., AC
DRILL, 25" Weigel, Tapping, M.D.
GEAR GENERATOR, 3" Gleason, Late
GEAR HOBBER, 36H Gould & Eberhardt
GEAR PLANER, "1" Rienecker, Bevel
GEAR SHAPER, No. 75 Fellows High Speed 5IA, 6A & 6SA, 6 Fellows
GRINDERS, 20"x120" Landis, Cyl., Hyd., AC
GRINDER, 18"x48" Cinc. Cyl., M.D.
GRINDER, No. 16Y2B Bryant, Int., 1943
GRINDER, No. 174 Heald Gap, Int. 54" sw., '42
GRINDER, No. 72A5 Heald Internal, 1943
GRINDER, No. 75A Heald, Int. Hand Feed
GRINDER, Micro-Internal, Large
GRINDER, No. 13 B. & S. Univ. M.D.
GRINDER, SURFACE, 13"x48" Hanecett Vert. Spin; No. 16 Blanchard, 26" Chuck
LATHES, 50"x15' Cen. Niles, blocks to 66", M.D.
48"x20'6" cen. Simmons, like new, '42
32"x25' cen. Sommerfeld, 2 T.A., 2 carr., '42
24"x12' bed L. & S., Modern Timken Spin.
22"x24'x"x48" cen. Skoda, New
20"x54" cen. Reed Pren., T.A., '47
20"x48" cen. American, T.A., (2)
No. 16 LeBlond Pro. 20" sw. x 36" cen.
TAPPERS, Nos. 1 & 2 Bakewell (4)
TURRET LA., 26" Libby "C" 4½" capty.
Nos. 3 & 4 Gisholts, Late
No. 1B Foster Univ., 2" capty. (2)
No. 2B Foster Univ. 3¼" capty. Bar.
RIGID-MIL, 96" Sundstrand, Thin, 30"x120"
THREAD MILLER, 12"x60" Morey Shields, '42
MILLER, UNIV., No. 2A B. & S., M. in base, Timken
MILLER, VERT., No. 4 Cinci. Hi Power, M.D.
MILLER, HORIZ., No. 2 Stand. K.&T., M-in-base
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PLANER, 48"x36"x8' Cinci. 4 Hd., Box, PRT, Force Feed
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SHAPERS, 24", 20" & 16" G. & E., AC, M.D.
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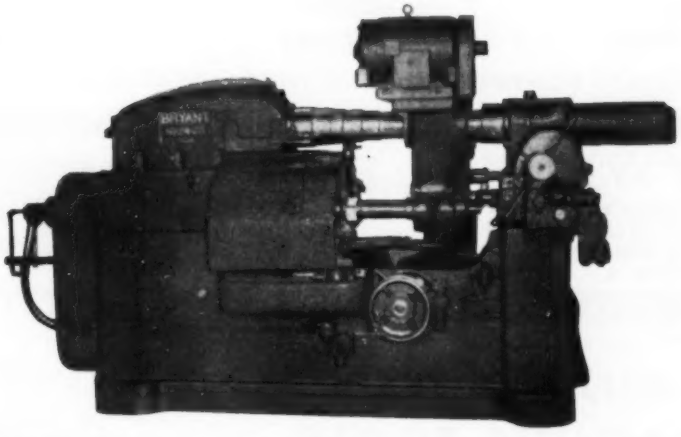
LATE TYPE BRYANT GRINDERS



SPECIFICATIONS OF BRYANT GRINDERS IN STOCK

- 24-L-36" —swing 36"; traverse 27"; 3 motors; max. grinding length 24"
- 24-36" —swing 36"; traverse 19"; 3 motors; max. grinding length 16"
- 24-B-36" —swing 36"; 3 motors
- 24-26" —swing 26"; traverse 19"; 3 motors; max. grinding length 16"
- 16-AM-28" —swing 28"; gap bed width 13½"; 3 motors; max. grinding length 16"
- 3" —swing 6½"; max. grinding length 2"; motor and controls

No. 112 BRYANT PRECISION HYDRAULIC INTERNAL GRINDER

Total chuck swing (without guard) workhead on center 16".
Total chuck swing (without guard) workhead adj. to 45°, 16".
Maximum traverse stroke 20".
Grinding stroke (maximum depth of hole) 9".
R.P.M. of work spindle (either direction of rotation) 100 to 1000 R.P.M.
Workhead movement—forward of center 6½".
Workhead movement—rear of center 3".
Motor driven coolant system.
A.C. motor drive, push button control.
Weight approximately 6,200 lbs.

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★ DRILLS ★ MILLERS ★ SHAPERS
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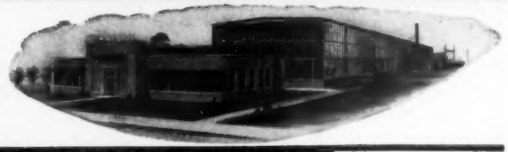

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No. 2-B Brown & Sharpe Heavy Plain
No. 2-M Cincinnati Univ., MD
No. 3-B Milwaukee Univ., SPD
No. 4 Cincinnati H.P. Univ., Lima Drive
No. 4-B Brown & Sharpe Heavy Plain, MD
No. 2 Knight Vert. Miller & Driller, MD
No. 4 Cincinnati Vertical, SPD

PLANERS

30"x30"x8' Gray, s/c speed-variator MD
30"x30"x18' Whitcomb, 2 heads MD
36"x36"x18' Gray Extra Hvy Duty, 2 heads, BD
42"x42"x10' Niles-Bement-Pond, 3 heads, BD
42"x42"x14' Niles-Bement-Pond, 4 heads, MD

72"x60"x14' Cleveland Openside, 3 heads, DC var. speed drive with AC MG set

GRINDERS

No. 11 Brown & Sharpe Plain Cylindrical, BD
No. 2 Diamond 12"x36" Surface, BD
No. 3 Abrasive 8"x22" Surface, BD
14—W Hammond Carbide Tool, MD, late
18"x72" Norton Plain Cylindrical, MD
20"x144" Landis Plain Cylindrical
10"x18" Norton Type "C" Cylindrical, MD, 1943

MISCELLANEOUS

Oliver Heavy Duty Die Maker, late
No. 4 Mitts & Merill Keyseater
Jackson Die Sinker
No. 3-A Warner & Swasey Univ. Turret Lathe, MD, Timken, 4½" hollow spindle
20"x25" Fay Automatic Lathe, new 1941
No. 6-A Marvel High Speed Heavy Duty Hack Saw, MD, 1943

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Niles-Bement-Pond 4" Bar
Niles-Bement-Pont 4½" Bar
Niles-Bement-Pond 60" Vert.

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American 3' sensitive motor on arm
Buffalo #2 Motor Spindle
Cincinnati Bickford 6' x 13" col.
Sibley 24" & 28"

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Gorton #3B 3 Dimensional

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Barber-Colman #12 Hobber (2)
Brown & Sharpe #13 Cutter
Fellows High Speed Shapers 712, 72, 725
Flather 72" Cutter
Gleason 3" Straight Bevel Generator
Gleason #4 Angular Bevel Tester
Gleason #2 Surface Hardener
Gould & Eberhardt 36" Cutter, Univ.
National Broach Red Ring Lapper
Schuchardt & Schutte #1 Hobber

GRINDERS, MISCELLANEOUS
Brown & Sharpe #2, #3 Univ.
Cinn. 12 x 48" Univ. Filmatic
Covel #91A Univ. Tool & Cutter, Hammond #4

Heald #81 Internal Gagematic
Heald 72A3 Int. Centerless Sizematic, #1 Tool
Landis 12"x36" Univ., Latest
Landis 6" x 30" Type C Cyl.
Norton 6"x18", 6"x30" Type C cyl., 10x18"
Norton 14"x48" Type C Univ.
Norton Roll Grinder 50"x28'
Oliver #510 Drill Pointer, Sellers 4G, 6G, Black Diamond
Porter Cable Belt WGB, G8; Greeby Int.
Pratt & Whitney Radius #R6, K.O. Lee Tool

GRINDERS, SURFACE
Abrasive 3B 8x24", #33, #34 Vert.
Blanchard #16, 30" Mag. Chuck
G & L #45 12" x 24" Hyd. Feed, #5 10" x 36"
Heald 22—12" chuck, Arter 12"
Norton 10" x 36" Hyd.
Pratt & Whitney 12 x 36" Vert.
Reid 11x36 Motor in Base
Thompson Hyd. 6 x 10 x 18", 6 x 12 x 18"

LATHES
American 20" x 8' Bed G.H. Lathe
L & S #2A Duomatic, Like New, #3 Duomatics
Hardinge Precision 9", 1" Collet Cap., Rivett
Hendey 14" Yoke Head Lathes
LeBlond Regal 10" x 3' bed
Putnam 36" x 22'
Putnam 42" x 17'
Sebastian 12" x 4' G.H.
Wickes 32" x 35' Geared Head

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Brown & Sharpe #000, 21, #2A Univ.
Burke #4 Plain & Univ. Vert. Hd.
Cinn. 08 PL & Vert.—Rise & Fall
Cincinnati, 1M Univ.
Kent Owens IV, 1M
Sundstrand 00, 0 Rigidmil

MILLS, VERTICAL
Brown & Sharpe #3 single pulley drive
Cincinnati #4, 08 Vert.
Morey #12M Profiler, 2 sp.
Pratt & Whitney #12B Profiler 2 Sp.

PRESSES
Bliss 645, 650 Hi-Production Presses
Bliss 20, OBI, 58, 62, 162 OB.
Bliss 4½ Double Action, Roll Feeds, Cam (2)
Bliss #78½, 330 Ton SS
Bliss 3½A Double Action Toggle
Ferracute EG54, 400 Ton Knuckle
Niagara A1¾, O.B.I.
Toledo 400 Ton Knuckle Joint #663
Toledo 29 Double Action Cam
V. & O. #102 O.B.I. Reducing

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500 Ton Shaft Straightener 24' Long Bed. Watson Stillman
125 Ton Southwark Press, Bed 96" x 30". 30" stroke, 2 to 4 ft. opening
80 Ton Wilson Press, 51"x24" Platen, 11½" St. 13" opening
50 Ton William & White, 20" St. 54"x20" Bed—24" opening
35 Ton Oil Gear Straightener
50 Ton Stokes Molding Press

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300 Ton Watson Stillman 24 x 20" Platen 11" St. 21" opening
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Air Hydraulic Presses—Arbor Presses #6C Famco—Band Saws Kalamazoo—Drill Presses all sizes—Hydraulic Press Northern 20 Ton—Injection Molders, 1 ounce—Power Presses, OBI, 1, 4½, 5, 7½, 10, 15, 20, 30 ton—Shaper, 7" Amco, 8" Shaperite—Shaper, Sheldon 12"—Shears, Foot 22" to 8', 16 & 18 ga.—Shears, Power, 3'x18 gauge to 10'x 10 ga.—Welders, Arc, Seam, Spot all sizes —Vert. Milling Attach. Haico H.S.—Motors, Grinders, Buffers, all sizes, etc.

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Brown & Sharpe, #1, 2 Hand, #10, 11
Denver 6, 2" Shell Turret (3)
Gisholt, 2L, Foster #3B
Jones & Lamson 2½" Saddle Univ.
#4R Libby 2" Cap. Univ.
Warner & Swasey #1A, 2A, #4 Univ.
Warner & Swasey #2 G.H. Late (4)

MISCELLANEOUS
Automatic B & S #00G
Automatic 4 Sp. 1½" Cone
Band Saw: Tannewitz #36M, DoAll Zephyr 36"
Band Saw: #8 Marvel Like New
Filers—Do All Band Filer
Filers—Grob Band Filer
Hacksaw: Marvel #6A, #6, #9; Peerless 6"x6"
Honer: Micromatic #H-1
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MISCELLANEOUS

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HEADER—⅜" No. 30 ODSS Waterbury Farrel
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18" Double End Gardner No. 218 Disc Grinder
36" Rotary Disc Grinder, Besly No. 342
No. 12 Bryant Flange Type Work Spindle
No. 16A-16 Bryant Hole & Face Grinder
No. 72-A3 Heald Sizematic
30"x160" B.C. Lobdell No. 3GH Roll Gr.
8"x24" Abrasive No. 33 Vert. Surf. Gr.
12" Heald No. 22 Rotary Surface Grinders
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No. 31 Ex-Cell-O Precision Thread Grinder

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5"x24" Seneca Falls Model "U" Lo-Swing
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No. 2FU Foster Fastermatic Chucking Turret
No. 5D Potter & Johnson Turrets
No. 7 Foster Turret 3"x21" G.H.—Bar Feed
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MISCELLANEOUS

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SHEARS

CLEVELAND type 443 Vert. Trimming; 1½" stroke
GARRISON 132" Gate; cap. 1"
LEWIS #5½ Alligator; 5¼" stroke
LONG & ALLSTATTER type A double geared Gate
LONG & ALLSTATTER Type B double head repying
MACKINTOSH HEMPHILL Bar; stroke 3½"

PRESSES—Hydraulic

BEMENT MILES (upward) 36" stroke
BETHLEHEM (Downward) 10" stroke
BETHLEHEM (Downward) Flanging, 60" stroke
MACKINTOSH-HEMPHILL (upward) 30", 36", 60" strokes

PRESSES—Power

BLISS No. 10A, 450 tons, 12" stroke
BLISS No. 15, 1200 tons, 20" stroke
FERRACUTE 100 ton cap., 2" stroke
TOLEDO No. 88 single crank, 10" stroke

PUNCHES—Vertical, Open Gap

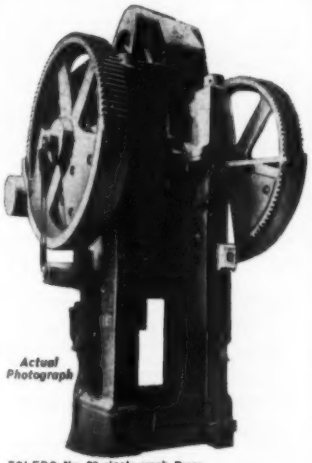
CLEVELAND type EF, 1½" stroke
CLEVELAND Type C, ½" stroke
CLEVELAND type C, 1¾" stroke
COVINGTON No. 2, 54", stroke 2"
HILLES & JONES No. 2, 1½" & 1⅝" strokes
HILLES & JONES No. 3, 2½" stroke
LONG & ALLSTATTER No. 2, 1¾" stroke
LONG & ALLSTATTER No. 3, 1½, 1⅝" stroke
MACKINTOSH-HEMPHILL No. 3, stroke 2½"
MASSILLON No. 5, 1¾", 2" strokes
WILLIAMS & WHITE No. 17, cap. 1" x ⅝"

PUNCHES—Multiple, Open Gap

CLEVELAND 500 ton Vert. 30" IX; 6" stroke
CLEVELAND 500 ton Vert. 30" IX, 3" stroke
CLEVELAND 24" Agate, 2½" stroke

PUNCHES—Multiple

CLEVELAND No. 1, ⅝" cap, 6" stroke
CLEVELAND 3" stroke; 120" throat
COVINGTON 10'2", stroke 6"
SOUTHWARD 400 ton, 7" stroke
THOMAS No. 20, 3" stroke, 35" throat
THOMAS No. 28, 3" stroke
WILLIAMS & WHITE Vert. 9" stroke, 30" throat



Actual Photograph

TOLEDO No. 88 single crank Press

ASK FOR OUR ILLUSTRATED CATALOG

PUNCHES—Double Head, Open Gap

CLEVELAND type C, 1¼" stroke, 28" throat
HILLES & JONES No. 3, 1⅝", 1¾", 2" strokes
LONG & ALLSTATTER Size "B"; cap. 2¼" dia., 1¼" thick

PUNCHES—Horizontal

CLEVELAND style A-L., 1¾" stroke
HILLES & JONES No. 2, 1½" stroke
HILLES & JONES No. 3, 1¾" stroke
HILLES & JONES No. 3, 1⅝" stroke

ROLLS—Bending & Straightening

CLEVELAND Straightening; cap. ⅝"x4'

SLOTTERS

DILL 18" stroke
NEWTON 18" stroke
PRATT & WHITNEY 9½" Vertical

HAMMERS—
Forging, Steam, Single Frame

ERIE, cap. 2500#
ERIE No. 1135, cap. 1100#
MONIGHAN "American" #910, 1100# cap.

HAMMERS—
Forging, Steam, Double Frame

CHAMBERSBURG 600#, 800#, 1500#
CHAMBERSBURG 6000#, model "E"
ERIE 4000#

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AJAX Lever forging, size 43"

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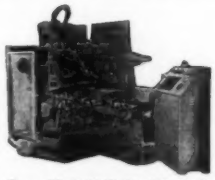


Type BL 2416 Keller Die Sinker

AUTOMATICS

2" 4 Spindle Cone, 1943
1¾" Cleveland, single spindle
8¾" Conematic, 5 spindle
1½" Billings & Spencer Dimatic Cutoff

BORING MILLS

Universal 3" bar
Lucas 3" bar, older
42" King, vertical, 2 rail heads
24" Bullard New Era, VTL

GRINDERS

81 Heald Internal Sizematic
14x48" Thompson hydraulic surface, 1943
10x48" Norton cylindrical
24L36 Bryant Internal
72A Heald Internal, late
70A Heald Internal, late
10 x 18 Landis C, plain cylindrical
#5 Giddings & Lewis, hydraulic surface
10G Sellers, single end, horizontal
#16 Bryant Internal, hydraulic
Rogers #76A, knife-grinder
Oliver single point, tool
Model 1311 Pratt & Whitney, contour

DRILLS

6'17" American radial
Natco, multiple head, 12 spindle
D6 Colburn, single spindle, #5 M.T.
#21½ Footburt, single spindle, #4 M.T.
Baker single spindle, #5 M.T.
30 HO Baker, two spindle, inverted type
Model 4230 Bodine Drill & Tapper, 12 sta.
Moline Hole Hog, 2 spindle, older

GEAR MACHINERY

7A Fellows, shaper, high speed, hvy dty
61A Fellows, shaper, high speed precision

LATHES

Harding speed lathe, 9x18" centers
#12 LeBlond Automatic Production
12 x 18" Lipe Carbo, semi-automatic
Model LoSwing 8 x 108" centers, g. h.
Gisholt Simplimatic, platen type
36" x 14' ctr. LeBlond, cone
J & L Fay Automatic, late
36" x 14' centers, American, late

MILLS

#5 B & S Plain Horizontal, cone
35/60 Cincinnati Hydromatic Duplex
#2B B & S Horizontal, cone
24" Cincinnati Duplex
#4 Cincinnati High Power Horizontal
36 x 27" x 6' Newton, planer type

FURNACES

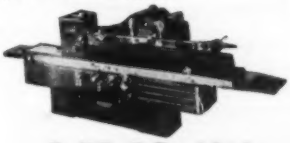
Despatch Model DT 26, draw, gas
Whiting Converter, 2 ton cap., late
Lithdraw heat treat, 1200° F, late
Thermonic Induction, heat treat, late

MISCELLANEOUS

ROTARY TABLE: 96" Ohio
PROFILER: Betts, 2 spindle
COMPARATOR: J & L, 30" shadowgraph
BROACH: #4 Lapointe, horizontal
KEYSEATER: #5 Mitts & Merrill
CUT-OFF: #33 B & O, 3" capacity
PLANER: Deitrick & Harvey, 48", Dble. housing
LAPPER: 86-36" Gardner, vert. spdle.
WELDERS: Hobart and P & H, Arc, 400 amp.
BULLDOZER: #2 Ajax High Speed, 30 ton

THREADERS

TG 615 J & L grinder, late
#2 Dalzen, 3" O.D., grinder
Model 40 Lees Bradner, miller
LT 6 x 36 Lees Bradner
#33 Excello External, grinder
#39 Excello Internal, grinder



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PRATT & WHITNEY Model "B" 16" x 36" motor-in-base
AMERICAN 16" x 8' and 18" x 8', 12-Speed Gr. Hd. Pan Bed, M.D.

TURRET LATHES

WARNER & SWASEY #4 Univ., Ser. #148786—bar feed—M.D.
WARNER & SWASEY #6 Geared Friction Head, M.D. Chucking, 2¼" cap.

PRODUCTION LATHES

MONARCH Model "2" 14" x 42" Magnamatic 12-Spd. All Electrical, full automatic double carriage, late—swing 14½", center dist. 42"
SENECA FALLS 4" x 60", 6-Spd. Gr. Hd., Lo-swing, M.D. swing 9¾", center dist. 60", 2 carriages
SENECA FALLS 8" x 108" Lo-swing Lathe (1942 vintage)—swing over ways 13½"—over carriage 10"—two 30" power feed carriages—template

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NORTON 20" x 120" Plain Self-contained Cylindrical
NORTON 24" x 240" Cylindrical Grinder, Type "A"

PLAIN, INTERNAL & EXTERNAL GRINDERS

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BROWN & SHARPE #1, Universal M.D. 10" x 20" (late type)—with attachments
BROWN & SHARPE #2 M.D. Universal Grinder 12" x 30" cap. (with attachments)
BROWN & SHARPE #4 M.D. Universal Grinder 12" x 60" cap. (with attachments)

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Gorton #3L Three Dimensional Pantograph 1942 A.C. M.D.
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No. 145 CLEVELAND Rigid Hobber
No. 1LMS LELAND-GIFFORD 6-spindle Drill. 1942.
#2LMS LELAND GIFFORD 2-Spindle Drill
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#48H G&E Univ. Gear Hobber
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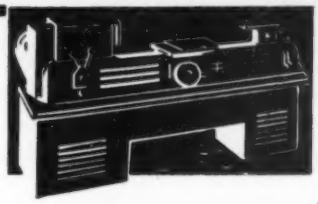

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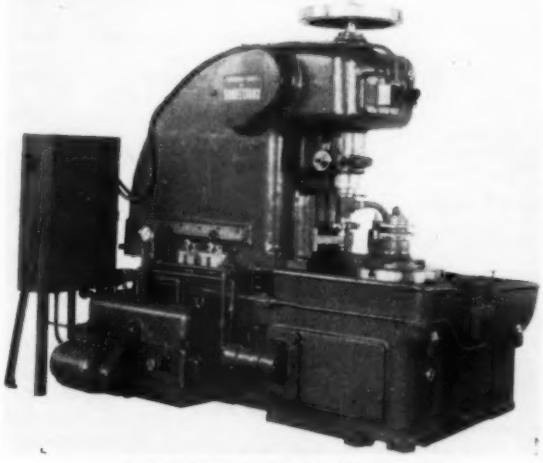

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GRINDER—Heald ‡72A5 Internal
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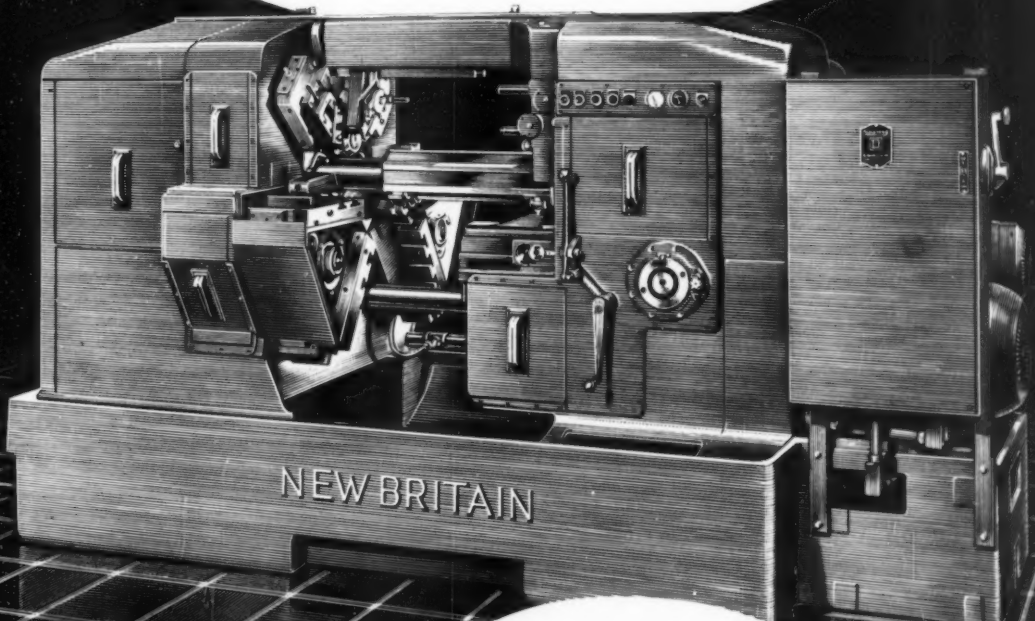
Greater Productivity

. . . More Horsepower . . . Less Man Power

TODAY American Industry is under pressure to meet fantastic demands. Only yesterday, intense competition was the problem. Manufacturers have found the answer to both situations in more productive machine tools. The New Britain-Gridley Division, The New Britain Machine Company, New Britain, Conn., U.S.A.

AUTOMATIC BAR AND CHUCKING MACHINES • PRECISION BORING MACHINES

LUCAS HORIZONTAL BORING, DRILLING AND MILLING MACHINES



NEW BRITAIN

Automatics

High speed shaper keeps in shape with TIMKEN® bearings

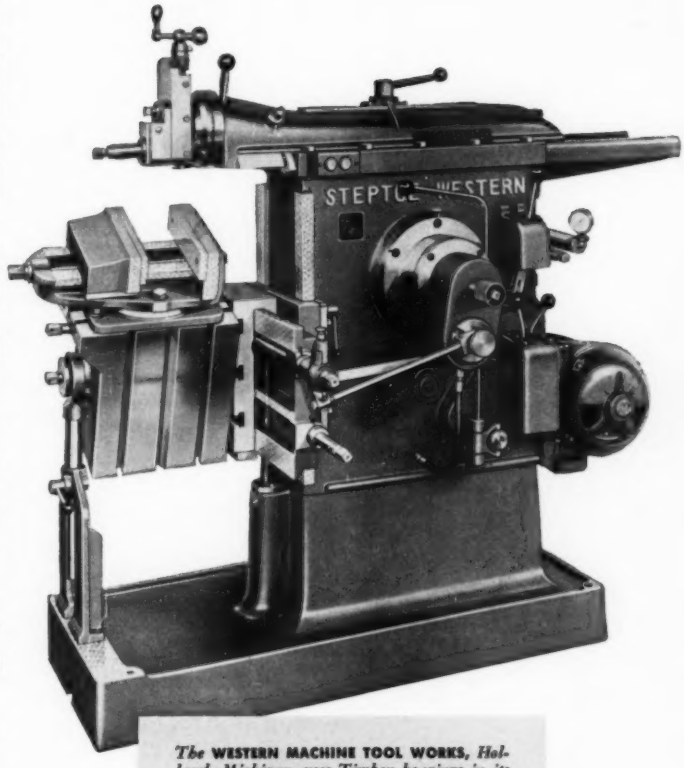
THIS Steptoe-Western 15″ shaper is one of the fastest precision shapers in its class. It has 18 ram speeds and works up to 200 strokes per minute. To insure precision and trouble-free operation, the Western Machine Tool Works has mounted the input shaft, three countershafts, and the main bull gear on Timken® tapered roller bearings—a total of 12 in all, with automatic pressure lubrication.

Timken bearings keep shafts in rigid alignment under the heaviest loads. Tapered construction enables them to take any combination of radial and thrust loads. Line contact between rollers and races gives them extra load-carrying capacity.

Manufactured to extreme precision and finished to incredible smoothness, Timken roller bearings make friction practically negligible. And since they're made of the finest steel ever developed for tapered roller bearings—Timken fine alloy steel—they last the life of the machine.

With 50 years of bearing research and development back of them, Timken bearings are first choice throughout all industry. No other bearing can give you all the advantages you get with Timken bearings. Look for the trade-mark "Timken" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



The **WESTERN MACHINE TOOL WORKS,** *Holland, Michigan, uses Timken bearings in its 12″ and 15″ shapers to insure consistent precision and trouble-free performance for the life of the machine.*

FINISHED TO CLOSER TOLERANCES

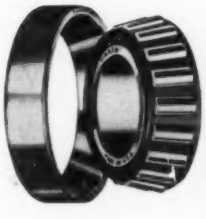
Finishing to incredible smoothness accounts for much of the precise, smooth rolling performance of Timken bearings. This honing operation is typical of the amazingly accurate manufacturing methods at the Timken Company.

The Timken Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ **NOT JUST A ROLLER** ▭ **THE TIMKEN TAPERED ROLLER** ▭ **BEARING TAKES RADIAL** ↓ **AND THRUST** →◫← **LOADS OR ANY COMBINATION** ↓→◫←